SCIENTIFIC AMERICAN
No. SUPPLEMENT 164

Scientific American Supplement, Vol. VII., No. 164. NEW YORK, FEBRUARY 22, 1879. Scientific American Supplement, $5 a year.
Scientific American, established 1845. Scientific American and Supplement, $7 a year.

PARIS EXHIBITION OF 1878.

OFFICIAL TRIAL OF PLOWS.

THE trial of plows at the French Exhibition took place at Petit-Bourg, in the department of the Seine and Oise, about 19 miles from Paris, under the direction of Monsieur Eugeae Tisserand, the Director-General of Agriculture of France, on the 29th of July, 1878. M. Tisserand had charge of the experiments in the field at the Exhibition of 1867, and was Director of the Government farms during the Empire. The trials this year were held on the farm of M. Decauville, an area of several hundred acres being placed at the disposition of the Director, and the American plows were very politely accorded the place of honor in front of the principal tent and Quartier Général.

Fowler, of Leeds, England, had two sets of steam plows on the field, and Debains, of St. Remy, Département Seine et Oise, had one set. Both did good work, but I do not propose to refer to them at length here.

The plows exhibited were five from America—a gang, sulky, and ordinary plow by Deere & Co., of Moline, Ill.; a plow by Gale, of Albion, Mich., and one by Speer, of Pittsburg, Pa. There were twenty-four French exhibitors, two from Italy, and one from Hungary. Some of the French exhibitors had as many as five plows of different descriptions, and the number in motion at once was about fifty-four. The ground for each was marked off by a furrow, and each was given a field to plow. The farm itself is level and devoid of trees and fences, except the fine avenue on the great Paris and Fontainebleau road, which runs through the tract, and is paved with square blocks, laid perhaps at the time when Francis I. lived in the spacious palace, and it is likely to last in good condition as much longer.

Owing to the land laws of France the soil is now generally owned in small tracts, and in the present instance M. Decauville rents it of nineteen different proprietors, but no signs of demarkation exist. He pays as rent the sum of 70,000 francs yearly to the different proprietors, and carries on the work in a manner unknown among us. There are about 300 acres of sugar beets on the farm this year.

American plows are preferred in France to the English, though, to judge by those exhibited in the French annex of agricultural implements, both are frequently copied. The true French plows, however, are in excess of those of either of the foreign nations mentioned, and there is an abundance

FIG. 1.—FRENCH WOODEN MOULD-BOARD PLOW.

of crude and heavy implements which may be termed Gallo-Roman, and probably not much unlike those used during the Roman occupation.

Wooden mould boards are not totally discarded yet. Manufacturers may do their best to introduce what they deem to be improvements, but after all they are obliged to make what the people are willing to buy. Such plows weigh from 80 to 240 lbs., and sell for from 30 to 75 francs; and a great many are sold for light and sandy lands. While the English plows have generally two wheels to gauge the depth, it is by no means so universal in France, and the cheap plows, which are made as low as 35 francs, are frequently wheelless. The French catalogues divide them into "without wheels," "with one wheel," "with two unequal wheels." Fig. 2 has a frame entirely of iron, and of an ordinary size weighs 132 lbs., and costs 85 francs. It is a very good implement and does excellent work. Its clevis arrangement is good both for draught and depth, and the draught chain is likewise commendable. The two-wheeled plow is the English form, with furrow and land wheels of unequal sizes, but the lever is French, and is used to lift the front end and tilt up the point so that the team will draw it out of the ground at the end of the furrow: a very good arrangement, and used also on the gang plows of France and of England, the plowman always walking at work. These plows are made heavy and are drawn by four horses or oxen.

No plow on the field did any better work than the Albion, Mich., plow, and in respect to turning the stubble under and leaving a clean land it surpassed the others.

Great interest was felt in the plows that had come so far to the trial, and perhaps the more that the English, who were so near and had an abundance of their plows in the Paris Exhibition building, had, for reasons best known to themselves, declined to come to the contest at Petit-Bourg.

In the next lot to the Michigan plow was one made by Speer & Sons, of Pittsburg, Pa. It was a fair representative of our common plow, made of good materials, and furnished at a very moderate cost; much cheaper to the dealers than the farmer has any idea of.

It must be noticed by all who travel by day in France that the usual plows have a fore-carriage which is intermediate between the team and the plow. Many extremely crude forms of this are to be seen, both in the fields and in the Exhibition, and were also at work at the trials at Petit-Bourg. Without attempting to give the cruder shapes, which might perhaps be taken as an exaggeration, the *charrue à chaine* is offered to exhibit the idea, and is one of the best of its class. Unlike the English two-wheeled plows, these wheels are of the same size, and as one runs in the furrow and the other on the land it looks as if the plow were tipped sideways, but the round beam adjusts itself in the socket of the fore-carriage (*avant-train*) and no harm results. These plows are made for four horses, and vary in price from 120 to 180 francs.

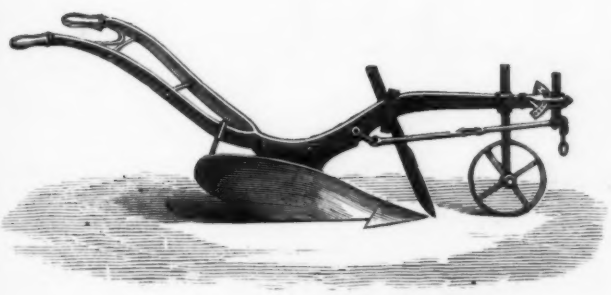


FIG. 2.—FRENCH ONE-WHEEL PLOW.

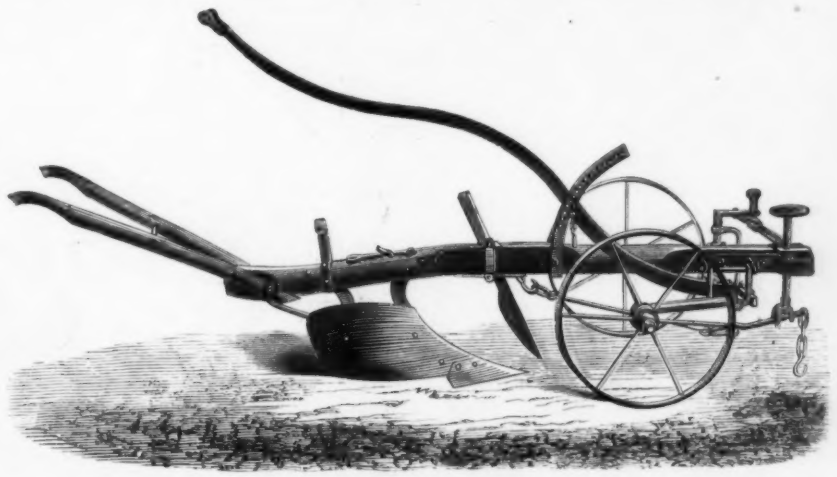


FIG. 3.—DOMBASLE'S TWO-WHEELED PLOW.

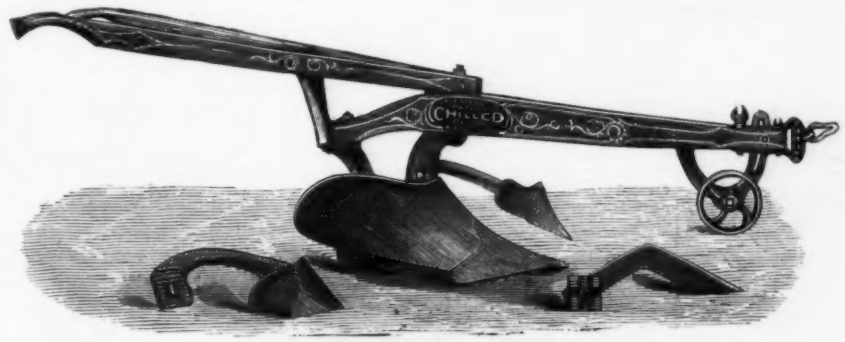


FIG. 4.—GALE'S MICHIGAN PLOW.

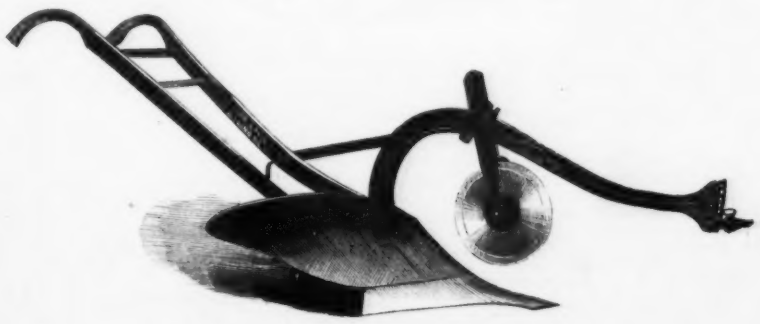


FIG. 5.—DEERE'S ILLINOIS PLOW.

FIG. 6.—DURAND'S CHARRUE A CHAINE.

Fig. 7 shows a transition state, in which the nose of the plow is pivoted to the *avant-train*, instead of merely resting upon it and being drawn by a chain.

Another step and we assimilate to the modern English style.

Fig. 8 shows Durand's single Brabant plow, in which the *avant-train* simply sustains the beam, and the draught is by

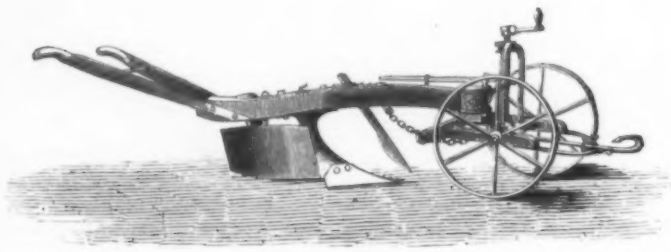


FIG. 7.—PLOW MOUNTED WITH DOMBASLE'S AVANT-TRAIN.

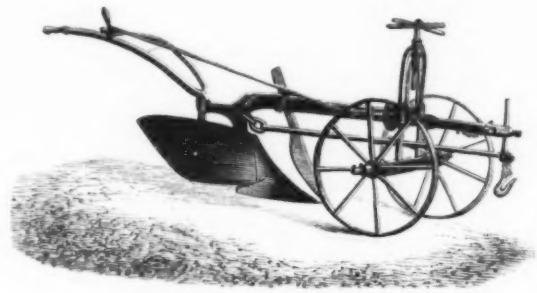


FIG. 8.—DURAND'S BRABANT SIMPLE.

a rod. In the circular handed to the spectators it is described as "intended for depths either ordinary or profound. It replaces with great advantage all the ancient models of plows. It will travel alone upon the earth without having care to hold the handles."

We may as well dissect one plow, and this affords as fa-

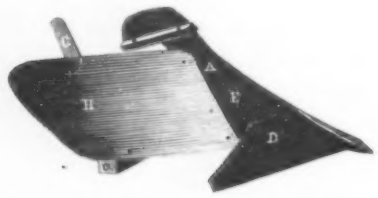


FIG. 9.—VIEW ON THE MOULD-BOARD SIDE.

vorable an opportunity as any. The plow manufacturers who may do me the honor to read these lines, and who may have a purpose to seek the French market, will thank me for matter which may inform them in advance of the degree of completeness of the French system of manufacture and of their methods of structure. I mention this as a reason

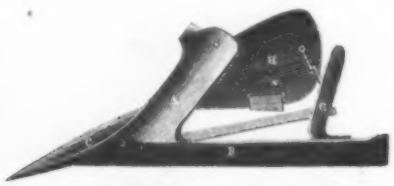


FIG. 10.—VIEW ON THE LAND SIDE.

for entering into careful detail in one instance, as I have no desultory purpose in view, but hope that my work may be useful in unfolding to those concerned the present status of a land that may become a good customer to our overloaded factories and shops.

The plow bodies are made applicable to any system of plows as well as to the *Brabant Simple*.

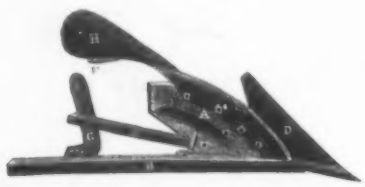


FIG. 11.—VIEW UNDERNEATH THE BODY OF THE PLOW.

The makers advertise to furnish the parts of the body, which can be mounted on any plow by country shops, according to the local custom of the country.

They are made either in cast iron or chilled, and in 12 different sizes, from those adapted for 1 horse to those for 12 horses.

FIG. 12.—VIEW OF THE SEPARATE PIECES OF THE PLOW BODY, MINUS THE MOULD-BOARD.

In Figs. 9 to 12 the portions of the plow body are shown. A is the standard, B the sole, C the corner piece, D the share, E the breast, covering the front of the standard, F is the heel piece to prevent wear of the mould board, G the rear standard, and H the helicoidal mould board.

The *tourne-oreille*, or Brabant double plow, has, as its name indicates, a turning mould board, so that at the end of a row it can be revolved on the beam (or the beam rotated), and converted from a right to a left hand plow or *vice versa*. This enables the team to return in the last made furrow, the near and off horses being alternately in the furrow. However clumsy it may look to us, it does excellent work, and if a whole community insists upon beginning to plow at the side of a field and plowing it furrow by furrow clear across to the other side, not plowing in lands, why of course they must have an implement to suit that mode of working, and here it is.

The Brabant plow is made of all sizes from the small plow adapted for one horse to the large one drawn by five yokes of oxen. They vary in weight from 165 to 770 lbs., and in cost from 140 to 300 francs. The depth of furrow for which they are designed is from 0·60 meter to 0·330 meter, say from 6½ to 13 inches, though the latter depth was much exceeded at the trial.

There are many different patterns of this implement, but all preserve the main feature of being convertible into a right or left hand plow, either by turning with a sleeve upon the beam or the beam itself turning in a socket on the fore carriage, or hinged to the beam, as in Fig. 15, which has a wooden beam, and no *avant-train*.

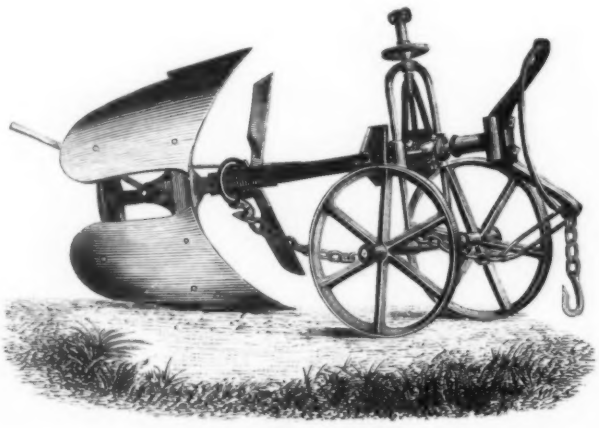


FIG. 13.—BRABANT DOUBLE PLOW.

Another form of what we call a hill-side plow, as we seldom use it for other purposes, was also exhibited. The English showed the same, but did not bring it to the trial. Speer, of Pittsburg, had a third form, in which shares are presented both forward and backward, and the beam revolves horizontally on a vertical pivot so as to bring either into action. Two mould boards are hinged to the breast of the plow, and one or the other is brought into operation according to the requirement of the case. This also was not shown in the field experiments. The French are similarly constructed.

The Director-General, like many of us at home, regards the gang plow as the plow of the future in large farming operations, enabling one plowman or boy to do the work of two or more by adding to the capacity of the plow and increasing the number of horses to the required extent. Quite

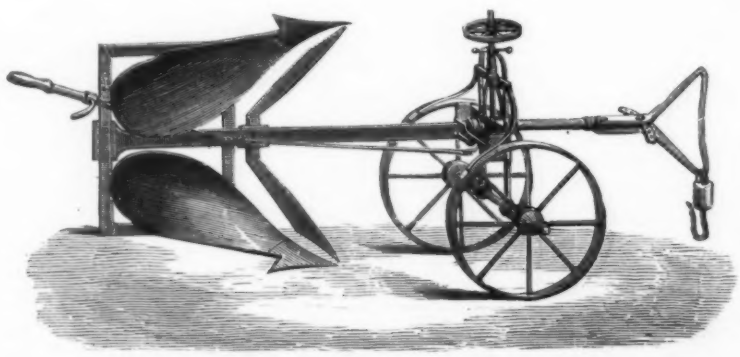


FIG. 14.—BODIN'S BRABANT PLOW.

a number of French and one American gang plow were shown at the trials. None of the English.

It must be said that the opinion of the Director seemed to be general, and the greatest interest of the day was shown in the competitive trials of Deere's Illinois gang plow and the *bisoc* of Meixmoron de Dombasle, of Nancy, France. With the former the plowman rides, and with the latter he walks behind. It was difficult to give a determination between their respective values. In point of finished appearance the American plow was far ahead, and in the character of the material employed I should say it had the greater excellence. The riding feature was very curious to most of the spectators, and probably adds to the draught, which may tell when the dynamometer comes to be applied to them individually. During the day the French plow was worked with 6 horses and the American with 4; when they were started on a competitive trial but 4 horses were allowed in each case, and the teams were changed when half the ground allotted had been plowed. At least that was the intention, but the teamster in each case whipped up so cruelly that in mercy to the brutes—no, not the brutes, but the horses—the trial was concluded rather sooner than was intended.

Another episode more amusing than the suffering of the fat Percheron horses was afforded by the fact that when the teams were changed and the teamsters, the latter tried to work in the interest of their former employers. The team of the French plow balked for a little while, and the man with the team on the American plow ran ahead of his horses for fear the French plow might be beaten. They also managed to smuggle both the whips to the French side, and slashed away, while Mr. Deere had only his umbrella to poke up the four horses on his plow.

This was only some by-play of the French teamsters and was soon stopped. There are no fairer people in the world than the French judges, but the workmen could not forbear trying to take advantages.

The Meixmoron de Dombasle *bisoc* is made of three sizes: the largest works to a depth of from 0·15 to 0·20 m. (6 to 8 inches); a land of 0·55 to 0·60 m. (22 to 24 inches) in the width, with 4 to 6 horses in ordinary land and 6 to 8 horses in hard ground. The smaller sizes use from 2 to 6 horses. The *grand bisoc* with cast iron standard and steel mould board weighs 544 lbs. and costs 290 francs.

The lightest size weighs 268 lbs. and costs 175 francs.

The Deere plow weighs 670 lbs. and costs 425 francs.

The Dombasle system, as is apparent by the cut, consists in rigging two plows to a single fore-runner with an inflexible bar which determines the latitude. In that respect it resembles our gang plow. The English system is to make an angular frame of iron, and the same plan has also been adopted in France, and several of the manufacturers had implements of this description on the ground.

There does not seem to be anything to urge against the principle of these, and they work well, but the plow Fig. 18 was preferred. In each case the long backwardly extending lever raises the forward end, so that the plows come out of the ground as the team reaches the end of the land, ready for turning.

The Gilpin sulky plow, made by Deere & Co., of Moline Illinois, was an object of much attention. So much regard has not usually been paid to the comfort of the workman. Our horse rakes usually have seats, and it is no uncommon thing to ride on our grain drills. It is not so here.

Besides the plows for executing the usual work, at this *concours* there were riding, subsoil, trenching, and mole plows, implements for digging potatoes, pulling up beets, harrows, rollers, clod-crushers, potato planters, grain and seed drills.

ing breast, and a curved board which directed the excavated soil on to the land at the side of the ditch. This is shown in Fig. 23.

The other one is adapted for cutting drains in natural prairies. The sloping cutter and the curved share cut the

potatoes on the surface. The second grid repeats and completes the operation.

Comparatively few people out of France have any adequate idea of the extent of the culture of the beet root. It furnishes nearly all the sugar used in France and a large

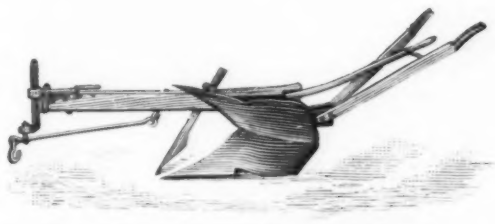


FIG. 15.—BRUET FRERES' TOURNE-OREILLE.

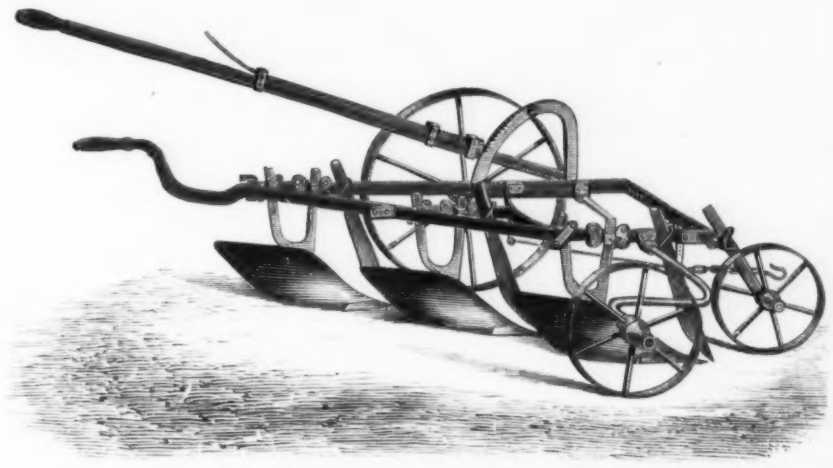


FIG. 19.—DALAHAYE-TAILLEUR'S CHARRUE A TROIS-SOCS.

The ridging plows, *buttoirs*, were stocked with wooden or iron beams, and are much used in the potato and beet culture; the rows of these are so close that the *buttoir* will ridge up against the plants on both sides going once in a row. These plows weigh 120 lbs. and cost 85 francs.

The subsoil plows are those which work behind an ordinary plow to break up the hard pan, but not to elevate it above the surface mould. Quite a number were exhibited, of which Fig. 22 is fairly representative. The price is 45 francs.

The trenching or ditching plows exhibited at Petit-Bourg were of two kinds. One had a deep cutting share, a slop-

sod, which is lifted and thrown equally on each side of the ditch. The plow has an ordinary *avant-train*, not shown in the figure.

The *sous-sol*, or underground plow, known to us as the mole plow, from the mode and effect of its work, is used as with us as a mode of effecting drainage of soils where water

proportion of the alcohol. The neighborhood of Paris is distant from the principal regions concerned in this culture, and the field of 300 acres of beets on the farm at Petit-Bourg, where the trial of plows took place, is regarded as but a patch. At Marmont, where the trials of reapers, binders, and mowers were held the week previous, there may

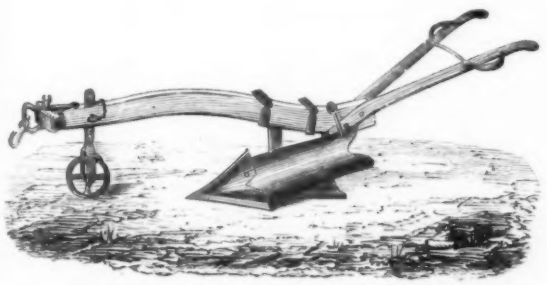


FIG. 16.—FRENCH TOURNE-OREILLE PLOW.

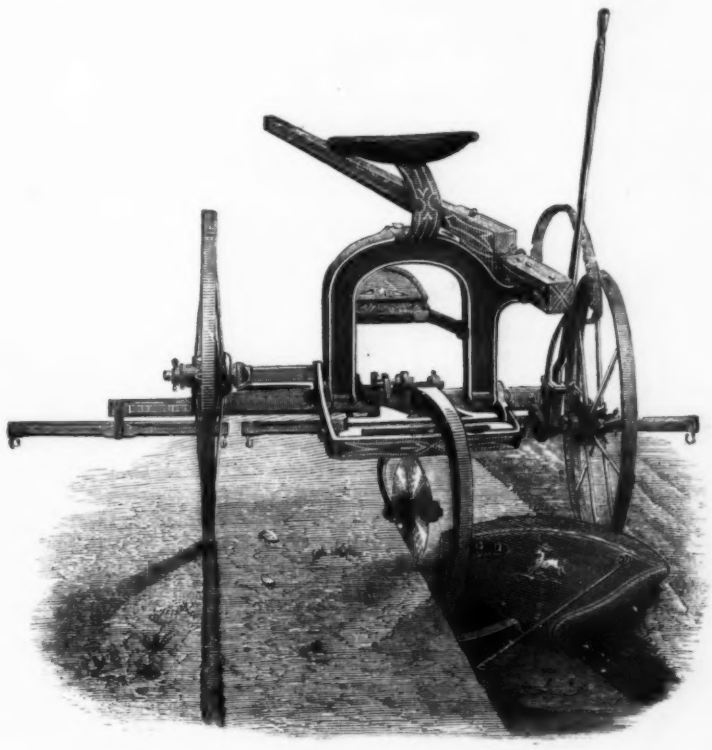


FIG. 20.—GILPIN SULKY PLOW, MOLINE, ILL.

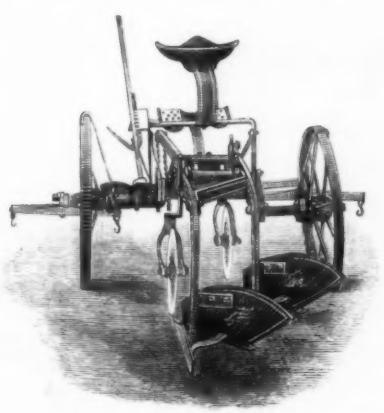


FIG. 17.—DEERE'S ILLINOIS GANG PLOW.

stands too persistently. Several of these were shown, but do not differ except in details.

The potato diggers were of single and double effect. One has but one set of lifting fingers, the other has two grids. The first runs beneath the hills of potatoes and lifts them, the soil falling between the bars of the grids, leaving the

have been about 250 acres in beets. One item in passing: 85 acres of beets on M. Charlton's farm at Marmont yielded last year 115,000 francs' worth of alcohol, tax paid. The tax on the yield of alcohol was over 1,000 francs per acre. The farmer and the government between them realized the amount stated from 85 acres of beets.

Several special implements have been made for the beet culture—plows which turn up the soil to a depth of fifteen inches; subsoilers which pulverize a further depth of six inches in the bottom of the first furrow; light plows for throwing the soil to or from the plants alternately in the process of tending the crop; double mould board plows for throwing the earth against both rows while passing once down the balk; machines for tearing the roots out of the ground, leaving them on the surface to be picked up in baskets and carried to the carts, or, as in the case of M. Decauville's farm at Petit-Bourg, to the miniature cars on the narrow gauge railway which runs around the principal fields and enables a horse to draw several tons, while the baskets do not need to be lifted more than three feet to empty them into the cars.

A beet puller, such as shown in Fig. 28, will deplant two and a half acres per day, and is converted into a potato digger by detaching the fork, 1, Fig. 29, and attaching the grid, 2. The point of excellence in an instrument of this kind is that it shall not cut the beet, and that it shall raise it and turn it over, and not wrench it out in such a manner as to break off the tap root and cause it to bleed. The price of the machine, made in three sizes, is from 170 to 200 francs.

The work of the harrow and rollers followed that of the plows, and some matters worth our consideration were shown, but the report will be too long if we consider them now.

In the official trial of steam plows at Gonesse, Département Seine et Oise, August 10, a few plows, drawn by horses and oxen, were shown upon the ground in order to enable

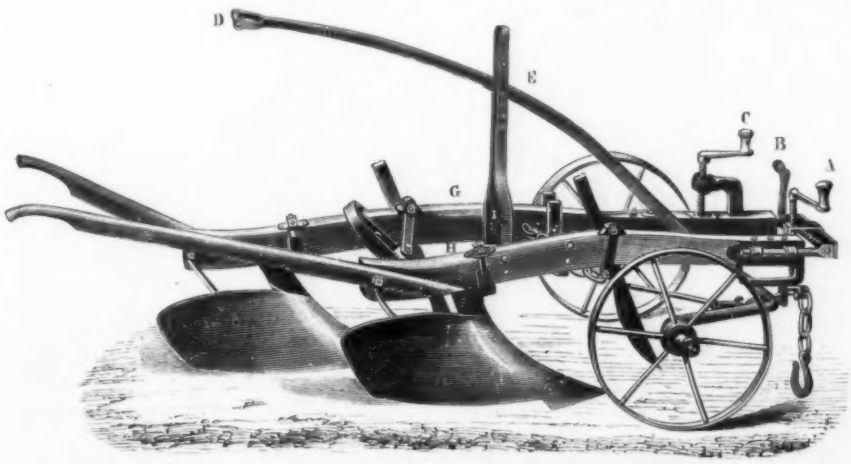


FIG. 18.—MEIXMORON-DOMBASLE'S BISOC.

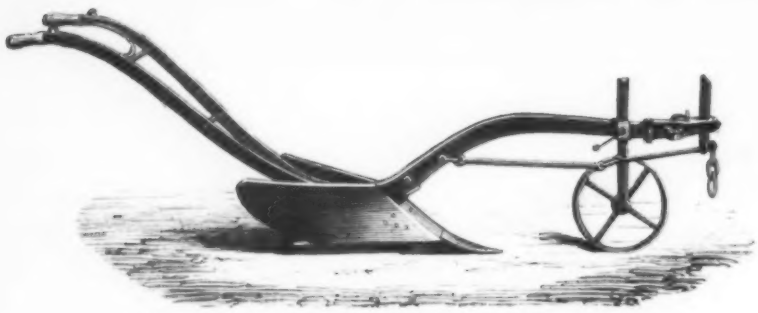


Fig. 21.—BUTTOIR, OR RIDGING PLOW.

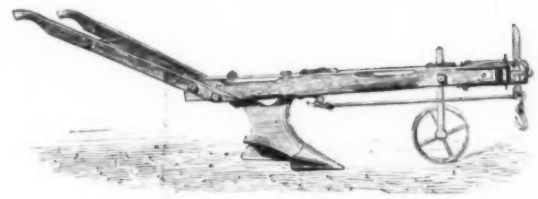


Fig. 22.—GARNIER'S SUBSOIL PLOW.

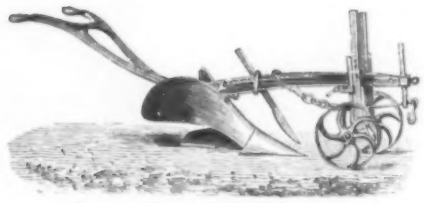


Fig. 23.—TRENCHING PLOW.

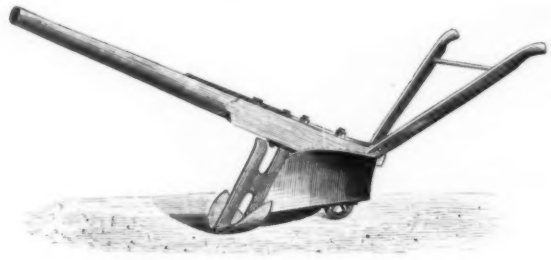


Fig. 24.—BILLOT'S TRENCHING PLOW.

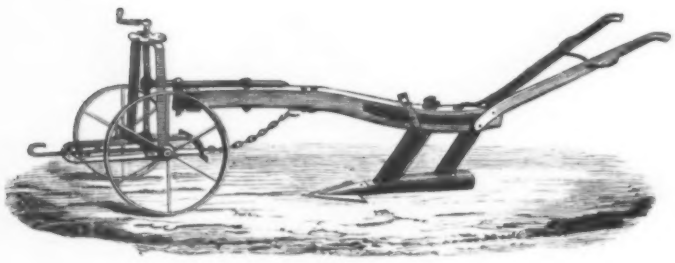


Fig. 25.—MOLE PLOW

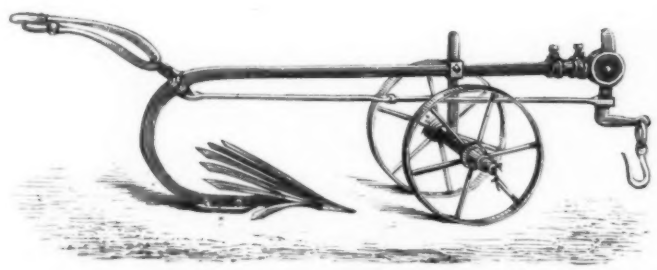


Fig. 26.—POTATO DIGGER (*Arrache pommes de terre*).

Fig. 27.—POTATO DIGGER (*Double-effet*).

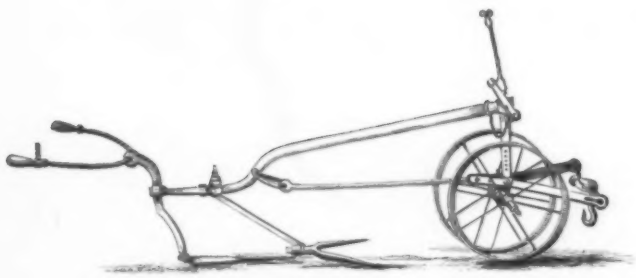


Fig. 28.—BEET-ROOT PULLER (*Arrache Betteraves*).

1. 2.

Fig. 29.—1. *Soc à fourche pour arracher les Betteraves.*
2. *Griffe à arracher les pommes de terre.*

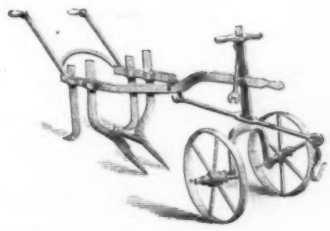


Fig. 30.—BEET-ROOT PULLER.

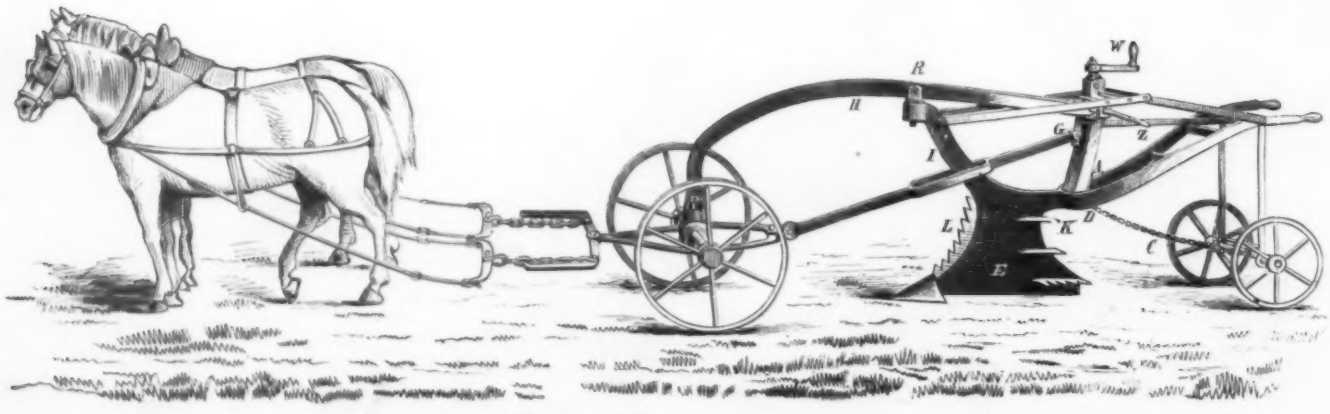


Fig. 31.—BOURDIN'S SUBSOIL AND CLEARING PLOW.

comparisons upon the spot of the steam and horse culture. A double Brabant plow was drawn by six yokes of oxen plowing to a depth of 45 centimeters, about 18 inches, and subsequently the wire rope from the locomobile was attached to the same plow in lieu of the oxen.

A small Brabant plow was then drawn by a pair of horses, and the machine represented, the Bourdin subsoil and clearing plow, was driven in the same furrow, stirring, lifting, and pulverizing the subsoil.

It has a deep, thin body, E, with a notched breast, L, a triangular share in front, and horizontal knives, K, when it has to be used to cut roots in ground lately cleared of bushes and shrubs.

To keep the sole of the plow level and preserve the gauged depth, the plow has, in addition to the draught rod, which reaches from the fore carriage of the plow to the standard, a second beam, H, to which the forward upward turned end of the beam, I, is pivoted at R. This forms a species of quadrilateral frame, whose pivoted angles permit such adjustment in the share frame as to raise or depress the point of the share, either to enter or rise from the soil, or the soil to run level at the depth for which it is set. The crank, W, and screw, operating upon the hind end of the draught rod at G, give the necessary adjustment.

C is a draught chain to the hind carriage, which also rides upon the ground and aids in keeping the plow level. When the wheels are withdrawn from supporting the handles, A, the rear end of the plow droops, and, the share pointing upward, the plow comes out of the ground.

The doubletree is an equalizer, permitting the adjustment of the leverage according to the different strengths of the horses in the team.

The conductor can, without stopping, change the land or depth of the plow by the handle, W, for depth, and Z for land.

It is the newest thing in its line in France and has attracted much attention. The blades, K, are removed, excepting when roots are to be cut, and the intention is to divide them into such short pieces that there will be no need to remove them from the soil. EDWARD H. KNIGHT.

Paris, October 1, 1878.

T. C. EASTMAN, MEAT EXPORTER.

By JAMES PARTON.

I TAKE the liberty of repeating that one of the most valuable and fascinating of all possible books yet to be written would be a history of business. Such a work would have to show how man has earned his subsistence during his long residence on this globe, how and with what he has trafficked and traded in every age, and how each of the great industries began and developed. It would show perhaps that business, despite appearances to the contrary, has been the controling agent in the development of civilization; it would exhibit the real causes of national prosperity and national decline; it would show the mechanic, the merchant, and the farmer eternally engaged in repairing the waste of warfare and of politics.

Such a book, well executed, the result of a lifetime of research, would prepare the way for the new era dawning upon the world, in which the people will know too much to be beguiled into invading other countries and cutting the throats of men with whom they have no cause of quarrel.

The name at the head of this article, unknown as it is to the general public, would have a modest place in a history of business, for it is that of the man who first successfully organized the system of exporting American meat to Europe, the most important event of a business nature which has occurred during the last ten years. I cannot doubt that this new traffic will work great changes in the whole life of our race. It will do much toward restoring in the United States the ancient dignity and profitableness of farming, and it will put a piece of good beef steak (as well as a big American peach or pear) upon millions of poor men's tables in Europe, Asia, and Africa, which have never yet known such comforts.

The steam refrigerator is the grand secret. It is a strange fact that a piece of American beef, after a ten days' voyage, can be placed in a butcher's shop in London in a better condition than that of English beef killed the day before. This is the great triumph—the perfect preservation of perishable food for considerable periods of time, by keeping it at an even temperature of about thirty-five degrees.

Would the reader like to know the long series of operations which resulted in placing upon the table of Queen Victoria a joint of American roast beef? The animal of which it was a part was reared, to the age of three years, with fifty thousand others, on a great cattle range in Texas. It was driven across the grassy plains to some point on the Pacific Railroad, and thence conveyed by rail say to Western New York. There some cattle farmer bought him, with a car load of others, thin and worn from their long journey, and he turned them out upon his farm. The representative animal which we have in mind then weighed about a thousand pounds. Placed in a stable in November, and fed in the best manner, he gained about three pounds a day, which made him in the spring a creature of the respectable weight of fifteen hundred pounds. He was then ready to be transported to New York, where he fell into the hands of Mr. Timothy C. Eastman, who had him driven to his great cattle yards at the foot of Fifty-ninth street.

At this place, by a rapid process, as near painless as possible, he was converted into four quarters of good beef. It may be the hot season of the year when this event occurs, but it is of no consequence. Cattle have been killed for the English market in New York at a temperature of one hundred degrees, and yet they reached England in perfect condition.

Now begins the wonderful part of the process. Mr. Eastman has erected near his slaughter houses huge refrigerators, called chilling rooms, which are so placed that the quarters of beef, while still retaining the whole of the animal heat, are conveyed to a temperature just above freezing. This sudden expulsion of the animal heat renders the surface exceedingly firm, and the whole mass is almost as hard to the touch as if it were frozen. Each quarter is then inclosed in canvas to keep it clean and to prevent its being bruised. In these chilling rooms the meat remains until the steamer is on the point of sailing, when, if the weather is warm, it is taken on board at night, in spring carts, as rapidly as possible.

On board the steamer, below the deck, a vast refrigerator is prepared to receive it—an air tight room, perhaps a hundred feet in length, thirty or forty feet wide, and higher than the tallest man's head. Great care is taken in the construction of this immense refrigerator, the invention of Mr. John J. Bate, of the city of New York. It is inclosed by three air tight walls, about an inch and a half apart, so as to exclude, as far as possible, the outer temperature. But a refrigerator must have ice. The ice house is a compartment at one end of the structure.

A fan or blower of iron, placed inside the meat chamber, is kept revolving continually by steam during the whole voyage. By the operation of this fan, the air is blown out from the meat chamber into the ice chamber, and again from the ice chamber into the meat chamber. Thus there is a continual rush of cold air among the quarters of beef. If the meat chamber is getting a little too cold, it is only necessary to lessen the speed of the blower; and if the temperature rises above thirty-eight, its speed is quickened a little. The meat is so sensitive, that if the temperature rises even to forty it would soon begin to lose its flavor, and if it should freeze but slightly it would not only receive injury, but spoil more quickly when exposed for sale in the shop.

As soon as the meat is deposited, the refrigerator is closed, and so remains until the moment when the men are ready to take it on shore. To preserve one ton of meat during an ordinary voyage requires nearly one ton of ice.

At Liverpool the largest refrigerator in the world has been constructed in which to store fresh American provisions until they are required for distribution over the kingdom. This is nearly an acre in extent, and is divided into various compartments, all provided with a chilling apparatus like the one on board ship, so that, if there is an over-supply, the meat need not be forced upon a glutted market. It is a remarkable thing that, although many millions of pounds of meat have been sent forward by this process during the last three years, averaging at times three thousand cattle a week, not one pound has been so much as tainted in the transportation.

This interesting business was begun in February, 1875, by Mr. John J. Bate, inventor of the fanning process, who sent forward at first twelve quarters of beef, twelve sheep, and six hogs. The managers of the steamship line had so little belief in the enterprise, that they refused to run his blower by steam, and he was obliged to work it by hand power. But, happily, the experiment was perfectly successful, and in the course of that year Mr. Eastman bought his patent, brought to bear upon the business new capital, energy, and tact, and developed it to the large proportions which it has now obtained.

The arrival of so much American meat in England created a genuine sensation, and even excited some alarm, lest it should ruin the English cattle raisers. Something like a panic was experienced, particularly when the beef was found to be of excellent quality. The agent took care to send some nice pieces to the Queen, the Prince of Wales, the Lord Mayor of London, the Governor of the Bank of England, Mr. Gladstone, and others, all of whom testified that they found it good.

It is much to the credit of the British farmer that, when he saw his business menaced by this irruption of foreign beef into his country, he did not send a deputation to Parliament asking for a protective tariff on meat, *i. e.*, asking Parliament to keep cheap beef off the poor man's table. At first the British farmer was a good deal frightened, but, after ciphering a little, and thinking a little, he found that the quantity of meat consumed in Great Britain is so enormous, that, if every steamer were to bring a good load of American meat, it could not lower the price enough to seriously injure him. The true protective tariff is to make your article the best. The English farmer acts upon this principle, and, so far, American meat, although very good, does not bring as high a price in England as English meat. In fact, the chief difficulty experienced by Mr. Eastman and the other American exporters is to find cattle up to the required standard of quality and weight. The best English beef now sells in London, by retail, at ten, eleven, and twelve pence per pound. American beef brings from sixpence to ninepence, according to quality and supply.

It seems almost impossible to overestimate the importance of this new business. The most valuable interest of the United States is agriculture, and I look to this exportation of fresh food as among the means by which farming will be made a pursuit far more attractive and profitable than it now is, so that young men of force, intelligence, and ambition will be drawn to it, and decline to expend their lives in a shop, a factory, or an office. It is the out-of-doors men who constitute the strength of an empire.

So far I had written when the last report of the Commissioners for Agriculture arrived, from which I learn that during 1877 Mr. Eastman exported 40,260 carcasses of cattle, and 20,496 of sheep, and that he is now beginning to send American meat to France as well as Great Britain. His word to the American farmer is: Raise me better and larger cattle, and I will sell them for you all over the world at better prices. —*N. Y. Ledger.*

SHEEP RAISING IN MONTANA.

A CORRESPONDENT of the New York *Evening Post* makes the following statement of the experience of a Montana gentleman who, in October, 1875, took on shares one thousand ewes for four years. During the first winter a few died, but his increase amounted to one thousand and fifty, half of which were ewes, so that at the end of the first year he had more than two thousand head. This year he sheared three thousand three hundred, and the lambs number one thousand five hundred, making a total of four thousand eight hundred head in the flock. With fair increase his lambs will next year number two thousand five hundred, or, at the end of four years (in October, 1879), he will have not less than seven thousand head, valued at $16,000. His share of the wool-clip will more than pay his expenses, so that in the end he will be able to return the original number—one thousand ewes—and half the increase, and still own a flock worth about $6,000, besides having $2,000 in cash as a result of his venture. Now, the other persons in this speculation are not less fortunate. They value the one thousand ewes furnished at $4,000; the person taking them paid all taxes and expenses for keeping during the four years, gave them half the fleece, and at the expiration of that period, returned the original number of average age, together with half the increase. They have received for wool the first year $600; the second, $1,000; the third, $1,500, and will receive next year about $2,200; or, on an investment of $4,000 for four years, they will receive the original amount, namely, one thousand ewes, and not less than two hundred and fifty per centum, or twenty-five hundred head of sheep, additional as increase and $5,300 in cash. A fair increase in sheep-raising is eighty per centum, but during the last two years it has reached as high as one hundred, and in some cases even higher.

The increase in the total number of sheep in Montana is very rapid. Less than eighty thousand sheep were in the year's enumeration for 1877, while the best authorities estimate the present number within the territory at not less than two hundred and fifty thousand. A single flock imported during 1878 numbers eleven thousand, another ten thousand, and still another six thousand. Some of these from California are considered the finest ever brought into Montana.

POPLARS AS LIGHTNING CONDUCTORS.

SOME time ago we noted the fact that a belief is current on the Continent of Europe that lightning strikes Lombardy poplar trees in preference to all others. Prof. Asa Gray, in a note to the *American Agriculturist*, says that the reason which lies at the bottom of this wide spread opinion is coming to light. Green herbage, and green wood—sappy wood—are excellent conductors of electricity. A tree is shattered by lightning only when the discharge reaches the naked trunk or naked branches, which are poorer conductors.

An old fashioned Lombardy poplar, by its height, by its complete covering of twigs and small branches, and their foliage down almost to the ground, and by its sappy wood, makes a capital lightning rod, and a cheap one. Happily no one can patent it and bring it round in a wagon and insist upon trying it. To make it surer, the tree should stand in a moist ground or near water, for wet ground is a good conductor, and dry soil a poor one. It is recommended to plant a Lombardy poplar near the house, and another close to the barn. If the ground is dry, the nearer the well the better, except for the nuisance of the roots that will get into it.

THE GRAPE CROP OF CALIFORNIA.

CALIFORNIA now produces more grapes than any other State in the Union, and nearly as many as all the others combined. In good seasons her product of wine alone has aggregated about 7,000,000 gallons, which is as much as is claimed for all the States east of the mountains. Besides this product, she has put large quantities of the product of her prolific vines into raisins, has distilled a considerable quantity of the juice into brandy, and at the same time has furnished the tables not only of the coast, but of the East, to a large extent, with their choicest fruit. And yet, says the San Francisco *Bulletin*, California grape culture is but in its infancy. Her vineyardists are only beginning to learn the peculiar adaptedness of their soils, the best variety of vine plant, the proper treatment to give them, and the best means of improving the quality of the fruit produced. Her wine-makers are still experimenting with the various grapes at their command; are only learning the relations of our peculiar climate to the product of the vine; are just beginning to understand the science of properly blending the different varieties of grape to produce the most excellent qualities of wine; are gathering experience in the manner of treating wines in order to adapt them to the average palates of our customers. In raisin making only a beginning has been made notwithstanding the State is now boasting of the scores of thousands of boxes that are put upon the market by her manufacturers. Thus it is evident that when the experimental era shall have passed, this industry, already so considerable in extent, will become one of the most prominent and important on the coast.

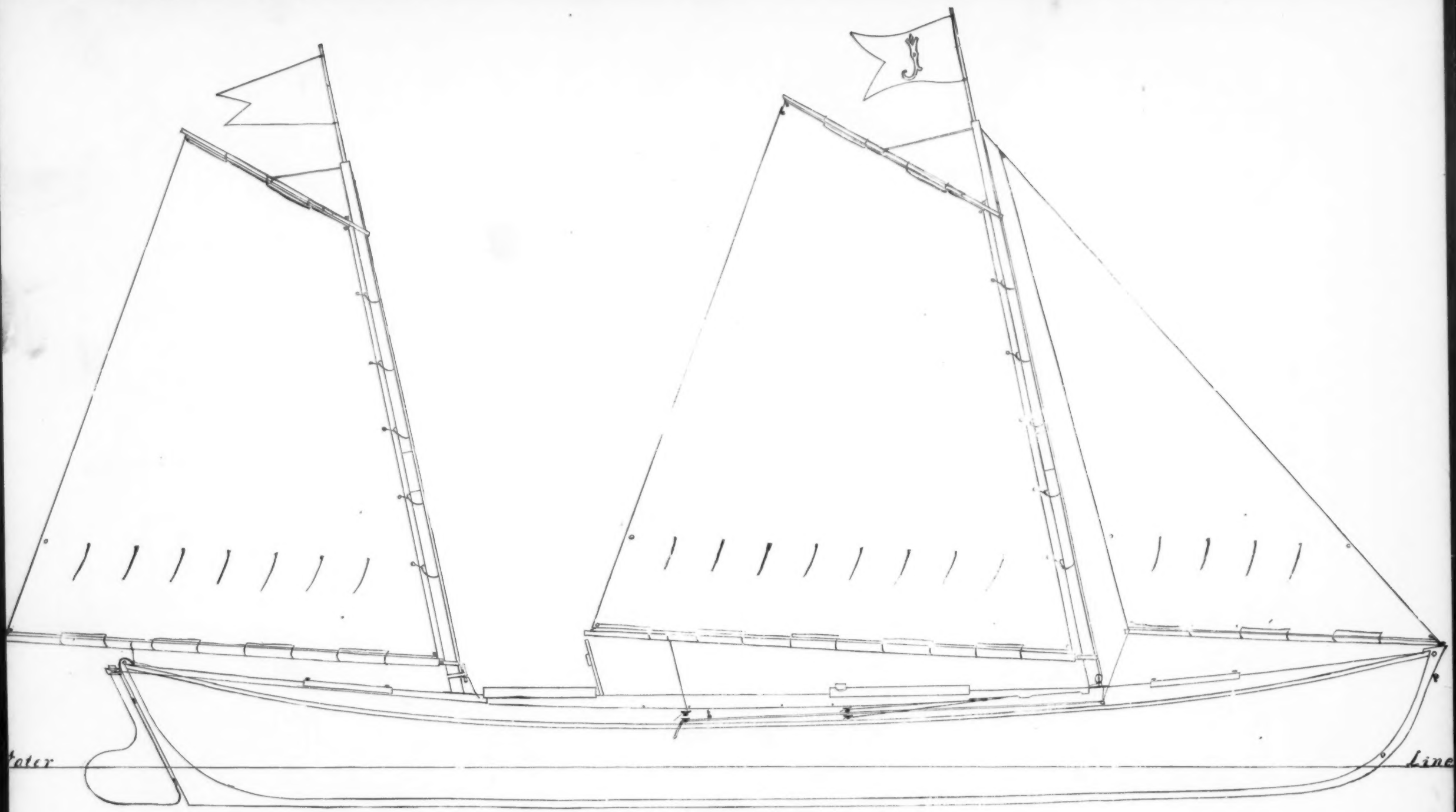
Grape culture for the past season has not been remunerative; first, because of a short crop, and, secondly, because of the low price the fruit has commanded in the market. Taking the wine product as the basis of calculation, it is shown that the yield is less than one-half what it should have been. In the Sonoma Valley the yield is but one-third, and in the Napa region about the same. It is estimated by the most competent judges that there are 40,000,000 vines in bearing in the State. These vines ought to yield not less than 12,000,000 gallons of expressed juice, or, more exactly, every three vines should yield one gallon of wine. But this yield has never yet been secured. Three years ago, when California wines were much more immature, or rather imperfect, the production was 7,000,000 gallons, which was found to be in excess of the demand. That was in many respects an unfortunate yield. It forced upon consumers a large quantity of wine that would hardly bear comparison with the average at their command, and was sold at prices much below what good wine should be worth. Nevertheless, the effect was to establish a price for California wines beyond which, notwithstanding the very great improvement since made in their quality, it has been found impracticable to advance. So that now, when California wines challenge the highest commendations of critical Eastern experts, and are even favorably considered by French connoisseurs besides their own most approved products, California wine makers are compelled to accept prices for their wines which barely pay the cost of production.

But with this capacity for producing 12,000,000 gallons, the product the past year has been only about the same as that of 1877, about 5,000,000 gallons, or less than half a crop. This is partly owing to the heavy volume of rain that fell the preceding winter, but more, doubtless, to the unexplained causes which forbid a full yield of any fruit, and grapes especially, except at intervals of three or more years. Should the climatic conditions prove favorable during the coming year, California may expect to astonish the world with her product of the delicious fruit.

There was, however, notwithstanding the short crop of 1878, a very great satisfaction derived from the quality of the fruit. Never before have the grapes of California been so rich and excellent, especially for wine-making. The light red wines are pronounced not only superior to any heretofore produced in the State, but the most competent tasters pronounce them equal to the best French productions. The fermentation is excellent and the quality really splendid. The white wines are also much improved over the product of former years, though probably not to so great an extent as the red.

Sweet wines are very scarce and command a high price in the market. Wines of this class, which in 1877 sold for 40 cents a gallon, now readily command 50 cents, and are hard to find at that. The makers are holding them firmly, and are not at all anxious to sell.

IN the Barmsee, a small lake situated in the Bavarian mountains, near the villages of Mittenwald and Krün, not far from the Austrian frontier, numerous piles, dating from prehistoric lake-dwellings, have just been discovered by Herr Zapf. The massive piles are standing upright in the lake; some of them still show incisions and spikes on their surface, indicating the spots where they were united, or where planks rested upon them. They stand in row parallel to the southern shore of the lake. Other rows run in a northerly direction, but in the latter the piles are smaller and stand close side by side, forming a sort of palisade. None of the piles now reach the surface of the water. The total length of these pile-dwellings is about 200 meters.



SAIL DRAFT

Paddle

Scale: 1 2 3 4 5 6 7 8 9 10 Feet.

Scale: 1 2 3 4 5 6 7 8 9 10 Feet.

CRUISING CANOE "JERSEY BLUE"

DESIGNED & BUILT BY Wm P. STEPHENS. RAHWAY. N.J. 1878.

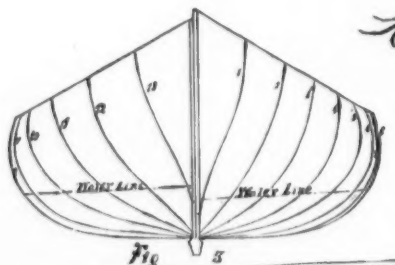


Fig 5

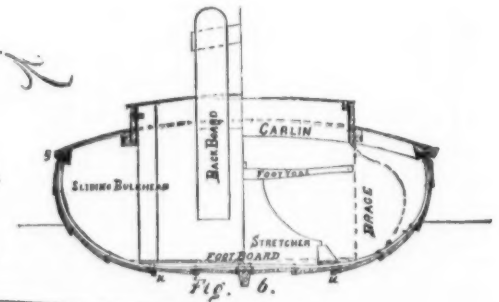


Fig. 6.

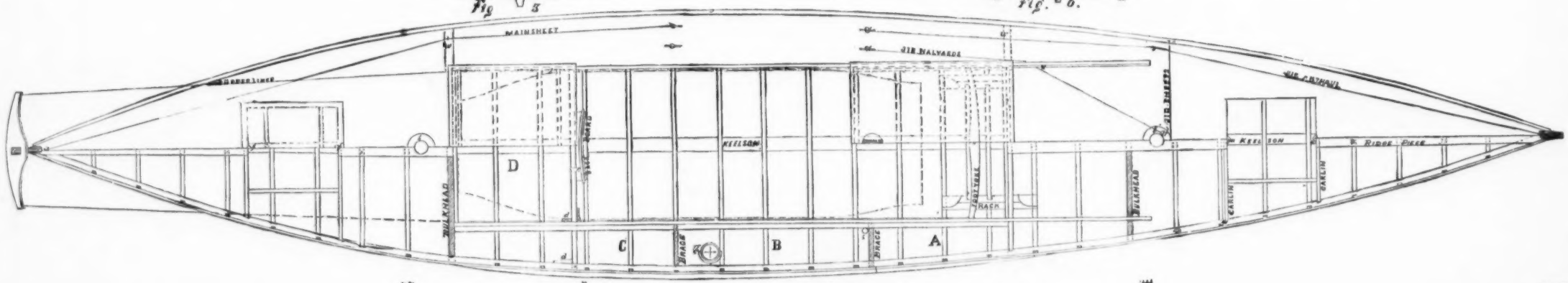


Fig. 3.

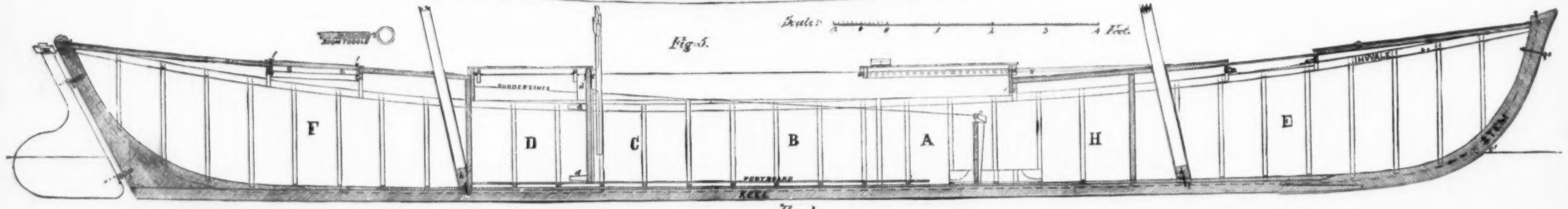


Fig. 4.

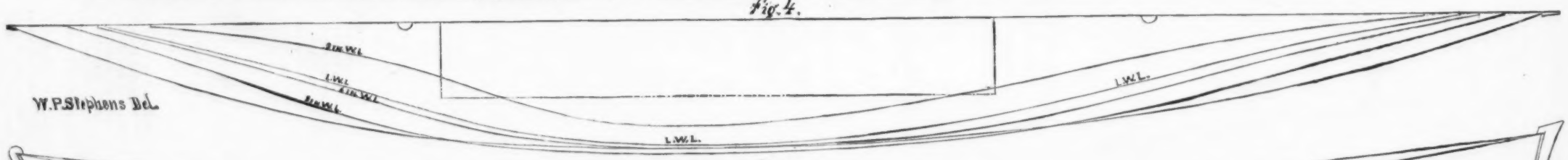


Fig. 2.

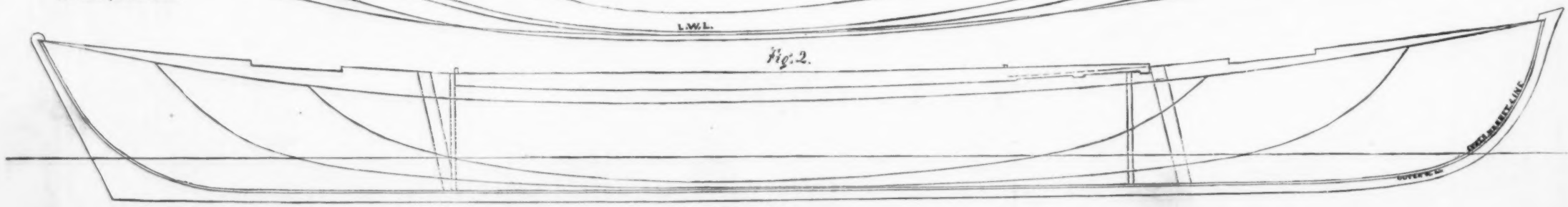


Fig. 1.

THE CRUISING CANOE "JERSEY BLUE."

By W. P. STEPHENS, Commodore Jersey Blue Canoe Club.

OF the many varieties of canoes now in use, from the birch bark to the kayak, the class of which the Nautilus is the original and a type, about 14 ft. long, 28 ins. wide, and 10 ins. deep amidships, with a heavy sheer, and carrying two or three sails, is undoubtedly the best for general cruising. The earlier English boats were designed more for sailing and had many faults, but the boats since built in this country, though of the same general style, are very much superior to them, though as yet hardly "perfect."

The boat described below was built after several cruises in a Rob Roy and "American Model" Nautilus, and the changes from the established model have been made where our experience has shown them to be needed, though we are indebted to the designer of the Shadow for the idea of the raking sternpost, making it easier to turn.

Figs. 1, 2, and 3 are the sheer, half breadth, and body plans, and show the form of the hull. The lines in Fig. 3 show the sections at spaces of one foot, the right hand half showing those from bow to the beam at Station 8, and the left, from Station 8 to the stern. The moulds for building on are of the shape of Nos. 4, 6, 8, and 10.

The water lines in Fig. 2 are at 3, 6, and 9 ins. from bottom of keel, the load water line being for a draught of 5 ins.

Fig. 4 is a longitudinal section and an elevation of the port side, and Fig. 5 a plan with starboard deck removed, the port deck and port half only of hatches being shown. Fig. 6 is the beam section, the left side showing the sliding bulkhead and backboard in elevation, and the right the steering gear. The stem and sternpost are of hackmatack or apple, and are screwed to the keel, which is of oak; the inner and outer lines of the rabbet being shown in Fig. 1. The keelson, of oak, is screwed on to the keel. The ribs are of oak or elm, $\frac{3}{8} \times \frac{1}{4}$ in., running in one piece from gunwale to gunwale, except near the ends, where they are fastened to the deadwood. They are spaced 3 ins. apart, and the streaks fastened to them with 1 in. copper nails, riveted over No. 13 copper burrs, as in Fig. 6; the nails along the lower edge of the garboards passing through garboards, keelson, and ribs. The streaks are of pine or of Jersey white cedar, the latter being the best wood we have for light boats; but amateur builders will find pine easier to work and more readily obtained.

They lap $\frac{5}{8}$ in., and are fastened by nails $2\frac{1}{2}$ ins. apart, each alternate nail passing through a rib. The thickness is from 3-16 to $\frac{1}{4}$ in., the three upper streaks being worked out of thicker stuff to fit the turn of the bilge. Owing to the sheer, planks with some natural curvature are easier to work. They are screwed to the stem and stern and also to the bulkheads (of $\frac{1}{2}$ in. pine) with $\frac{5}{8}$ No. 5 brass screws. A bilge piece of hard oak, *u*, runs along the lower edge of streak No. 3 from 6 ft. from bow to 10 ft., to protect the bottom from stones, etc. A half round bead of mahogany, *y*, covers the joint of the deck and gunwale. The deck is of 3-16 in. Spanish cedar, and is fastened to the inwales, carlings, ridge-pieces, bulkheads, and side pieces of well, which are all of pine, with $\frac{5}{8}$ No. 4 brass screws. It is made sometimes of but two pieces, the only joints being along the ridge, but if made of six, with the joints at *w* lapped one inch and laid in shellac varnish, they will be as strong and much cheaper. The fore and after hatches are fastened with brass thumb-screws, *f*, and nuts, *a*.

The elliptical well is preferred by many as being the strongest, but the objections against the old coffin-shaped well do not apply to the square one shown, as it is fully as strong as the others and more convenient, besides allowing a higher combing, a great advantage. The width depends on the taste of the canoeist, 20 ins. being the usual size, but we have found a 17-in. one large enough for comfort and much drier in a chop sea than a wider one.

The combing, of mahogany, is supported by side pieces of spruce or pine, fastened at either end to the bulkheads and also to braces shown by dotted lines in Fig. 6, or, if preferred, to knees as shown, which are more shipshape but less convenient. The combing extends over the forward deck, and on it slides a hatch ready for instant use, but not in the way when not wanted. A rubber cloth apron, 3 ft. long and 22 ins. wide is rolled up on the after edge of the hatch, and when needed is fastened over the well by loops of light twine, which will break in case of an upset, hooked on screw heads on the outside of the combing, the ends being fastened in the same way to the backboard. The movable bulkhead is of $\frac{1}{2}$ in. pine, strengthened by battens and rests against blocks, *d*. To it the backboard is hung by straps, *e*, and the space abaft it is covered by a hatch fastened down with hooks and staples.

The foot board is of pine resting on bottoms on the ribs. The arrangement of the steering gear is shown in Figs. 4 and 5, the rudder lines of copper wire running inside the well, and the stretcher being adjustable in a rack for a long or short-legged crew.

The masts are stepped in brass tubes, a wooden plug, *h*, closing the lower ends, fastened by a piece of wire, *i*, through it and the keel, and a brass disk, *b*, is soldered to the top and screwed to the deck, thus keeping all water from the hold. A strip of sheet brass runs around the stem, as shown in Fig. 4, and a piece of iron may be screwed to the keel to protect it. The holes in bow and stern are for the painter (15 ft. long of braided cord), but a ringbolt, as at *c*, is better, as the bow is sometimes split by a jerk at the top, while a hole, *c'*, near the water line is still stronger and is used in dragging over mud and sand, as must sometimes be done.

In building the keel, stem and stern and keelson are screwed together and set up, and the moulds placed at 4, 6, 8, and 10 ft. from the bow, as described in previous numbers of the SUPPLEMENT, and the planks laid on, beginning of course at the keel, and riveted 3 ins. apart. The ribs being so small may be steamed and clamped in place without previous bending, and the rest of the nails put in through them. The previous articles on the subject will make the details of construction clear.

For sleeping, the sliding bulkhead and stretcher are removed, and if stormy the booms swing over the well and a rubber blanket thrown over them and fastened down to windward, making a dry and comfortable resting place. In the spaces, C C, are hung tin pockets, one holding twine, maps, guide books, towel, etc., and the other a lunch for the day, the cook's stores being carried with the baggage in the holds, E and F, where they are hard to reach while afloat. A woolen blanket, coat when not in use, and other things needed from time to time are carried at D, where they can be reached when under way.

The cooking apparatus and a can of spirits (for fuel) are stowed at H. The spaces, A A, hold, on the port side, a sou'wester and oilskin coat, and on the starboard, a rubber blanket, hung in straps under the deck, and at B, on the port side, is a light cedar cask for fresh water when cruising in salt water, while opposite are hung various small articles, pen, tooth brush, camp knife, lantern, etc. One of the pleasures of the true canoeist is his log, treasured carefully and pored over winter evenings, tracing his course on the map, and planning new cruises; and a traveling inkstand set in the deck at *t* enables him to post in in comfort, the hatch answering for a writing table. The compass may be carried on the footboard between the knees or on the hatch when the apron is used, or may be hung under the deck and a round piece of glass set over it, as at *z*.

The spruce paddle is jointed in the middle with brass tubing, the blades being bound with sheet copper, and half a soft rubber ball being slipped on each half to prevent any water running down.

The woodwork is all varnished with copal. The most convenient and easily handled rig, especially for beginners, is the sharpie or lug, shown in Fig. 8. The booms are held in place by rubber bands, looped around the masts and the boom ends, and there are but few ropes. The favorite English rig is the sliding gunter, shown in Fig. 7. The topmast slides up and down, two brass bands on it encircling the lower mast, which, however, is thick and heavy. A small sail is carried aft called a dandy, and also a small jib. The rig we prefer is the schooner, shown in the sail draught. The rake of the masts is $2\frac{1}{2}$ in. to the foot, but may vary to suit the taste. They are jointed in the middle, the same as the paddle, in order to stow under deck. The jib is laced to a light club. The jib halyards run through a block, *l*, near the deck and aft to a cleat on the port side. The jib out and in hauls run through an eye at the bow, and aft, to port, and the sheets, through eyes on either side of the deck, and aft, to starboard.

The fore-halyards run through a block and aft to their cleats on the starboard side, and the main are belayed to small pins on the mast. The main sheet runs through a block at the stern and forward within reach of the left hand, and the foresheet is held in the right hand. The dimensions of the sails are given in the draught. They are of heavy muslin, or of "Boyle's yacht drill," a material made purposely for small boats, and they have one row of reef points. Stationers' eyelets, size B B, make the best grommets. A cord is run in the hem of the sails to prevent stretching. The boom toggle is shown in Fig. 4, the gaffs having the usual jaws. The rigging is of No. 8 hawser laid cord. The best working apparatus is the Rob Roy cuisine, but this is expensive, and there are several small lamps in the market which will answer to cook a cup of coffee, etc., most of the cooking being done over an open fire ashore. No leeboard is carried, as they are condemned by most canoeists. If preferred, another hatch may be used, running from the sliding hatch aft to the backboard and fitting closely to the body, but it is always in the way and keeps the well hot and uncomfortable. If is desired to make a canoe do double duty as a trunk, a bulkhead may be fitted at the forward brace, and the sliding hatch locked to it, giving the spaces A and H for stowage, but no old canoeist cares to send more in his boat than she will carry afloat. The weight of this boat is: hull alone, 72 lbs.; rigged complete, a little under 100; but for most purposes she need not weigh more than 60 and 85 respectively, the extra weight in this case being due to more strength in some parts, as she was built for a long cruise where a breakdown might be hard to repair, and to various small additions which may be dispensed with on short cruises, but add greatly to one's comfort where the boat is a home by day and night for weeks. The spars may be of spruce or of bamboo, which is lighter. The spread of canvas is: jib 9 ft., foresail 20 ft., and mainsail 16 ft., making 45 ft. in all, but owing to the flat floor and ample bearings no ballast is needed, though the old models required 40 or 50 lbs. for the same spread. A rubber bulb syringe makes a good

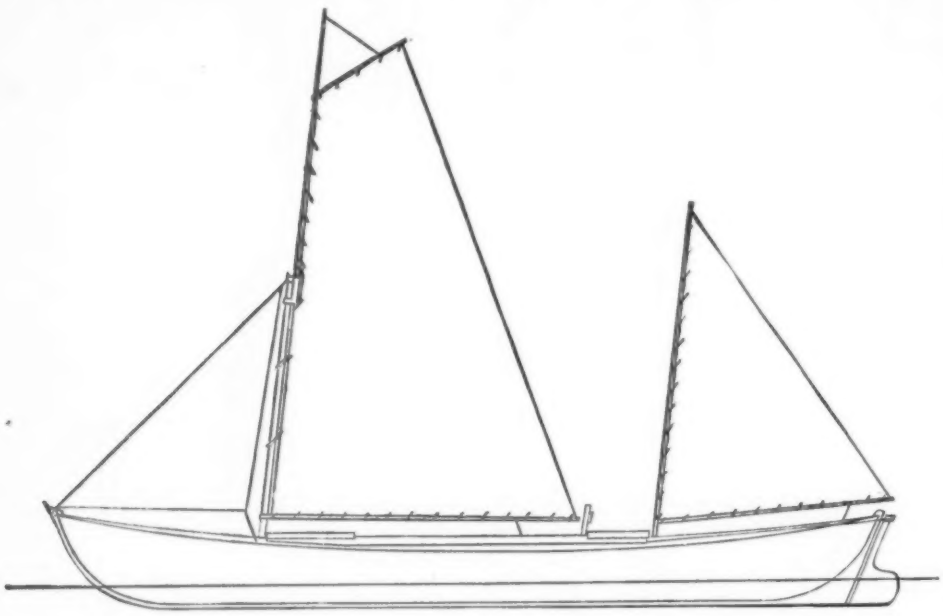


Fig. 7.

Scale: 1 2 3 4 5 6 7 8 9 10 11 12 Feet.

RIG OF THE CANOE "JERSEY BLUE."

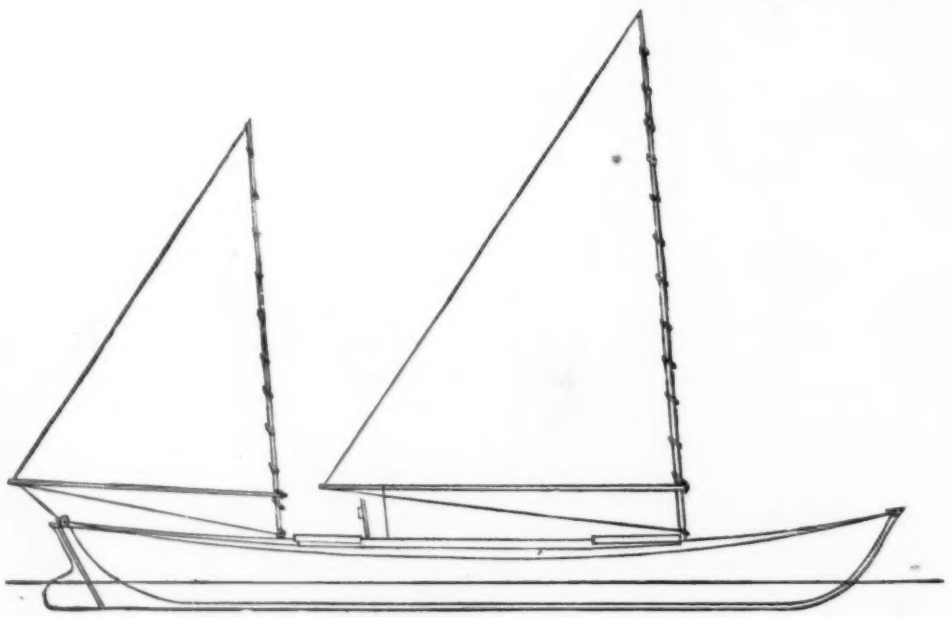


Fig. 8.

Scale: 1 2 3 4 5 6 7 8 9 10 11 12 Feet.

RIG OF THE CANOE "JERSEY BLUE."

bilge pump, as some water will occasionally find its way into any boat. If any of our suggestions should be adopted by canoeists we should be pleased to hear the result, and will also be happy to furnish any further information regarding the boat.

W. P. STEPHENS,
Commodore Jersey Blue Canoe Club, Rahway, N. J.

WHALING ROCKET TRIAL.

WE lately witnessed in Oakland creek a trial of the Roys & Liliendahl whaling rocket, which took place in presence of a number of persons interested in the whale fisheries, among them Capt. Truman of the Sea Breeze, Capt. Halsey of the brig Siberia, Capt. Bourne, Capt. Smith, Mr. Thompson, Mr. Brooks, mate of the Hunter, and other officers of whaling vessels. The Roys whaling rocket has been known for a number of years, but its introduction and use has not been successful, for the reason that the defects in construction operated against its efficiency. Messrs. Fletcher & Suits, owners of patent rights for this coast, experimented with the rocket for some time in order to test it and find out the defects, knowing the principle was good. They found that it had been previously made too light, and that there was not power enough in it. Moreover, in order to make it cheap, the details of the construction had not been carefully worked out. They have improved upon the rocket, made it heavier and stronger, and finally made a practical theory of it. Their success is evident from the fact that outside of the harbor, during the year, they killed 35 whales—hump-back, sulphur bottom, and fin-back—using the rocket from a small steam launch.

The apparatus consists of a strong brass cylinder containing the projectile charge. This is loaded with a peculiar powder, made by Fletcher & Suits themselves. In the front of this is secured a bomb containing an explosive charge, and inside of it is a harpoon attached to the shell. An iron is secured to the rear end of the rocket, to which is attached the whale line. The bomb has a bearded or barbed point, and when projected into the whale by the rocket, explodes, inflicting a fatal wound. At the same time the harpoon takes its hold, and the boat is fastened to the whale by the line attached to the iron. These shots are good for killing and fastening to a whale at 30 fathoms distance, which is, of course, very much further than an ordinary harpoon is available. The whole apparatus weighs 32 pounds, and from the point of the bomb to rear end of iron is seven feet five inches in length.

A peculiar rest is used in firing the rocket, having on it a shield to protect the operator from the fire which issues from the rear end of the rocket. The rocket is set in the rest, the rear end of which is placed on the shoulder, and by discharging a pistol charge into a hole provided for the purpose—after aim is taken—the projectile is discharged and the rocket powder carries the rocket, bomb, and line in the direction required.

At the trial the other day the apparatus was placed on a boat and the spectators were on the whaler Dawn, now lying in Oakland creek. A tub was allowed to float down the stream and was used as a target. A young man named Stanley, who is expert in the use of the rocket, fired the first shot at the tub, the projectile striking within a few inches of it. Then Capt. Truman, of the Sea Breeze, fired a shot, gauging so as to take water short of the tub, in a position which would strike the whale's belly. The shot went as directed, passing close under the tub. Capt. Truman sat down, not having braced himself. There is, however, very little recoil, and that is taken by the standard which answers to hold the rest. Capt. Halsey, of the Siberia, then fired a shot, which was also intended for the whale's belly. It passed immediately under the tub. Those who had not seen the rocket fired before were all surprised at the accuracy with which it went, even when fired by those unaccustomed to its use. Any one of the shots would have killed. All of those present expressed themselves highly pleased with the exhibition. There were several there who had previously used the rocket, but others had not, and it was for the edification of the latter that the trials were made.

Already some six vessels have outfitted with this apparatus for the Arctic, each carrying from five to fifty shots. One vessel is to leave shortly, taking with her a steam launch and an outfit of these rockets, hunting the whale with steam and powder instead of oars and muscle. By the use of this peculiar rocket, in the Arctic, where the bowhead are so shy, the whale can be killed anywhere within a distance of 30 fathoms, while on the way it is very difficult to get near enough to them to kill. Very little practice will enable any one to shoot the rocket very accurately, and wherever it strikes it kills, no whale getting away when struck. Messrs. Fletcher & Suits have acquired the right of manufacture and sale of these rockets for this market, and will probably fit out nearly the whole whaling fleet this season. Capt. Williams, an owner of three whaling vessels, is so convinced of the efficiency of the apparatus, that he says he wouldn't go on a whaling voyage without it. In fact, its introduction as a part of a whaler's outfit is no longer matters of doubt, all those who have used it speaking highly of the apparatus.—*Min. and Sci. Press.*

THE CLEVELAND (OHIO) VIADUCT.

THE new viaduct over the Cuyahoga river and the adjacent low grounds, connecting the two parts of the city of Cleveland, Ohio, is 3,211 feet, or nearly two-thirds of a mile in length, and cost over two million dollars. The *Herald*, of that City, describes the structure as follows, beginning at its eastern end, on the crown of the hill at the intersection of Superior and Water streets:

The first 150 feet is heavy stone retaining walls, filled in with earth, and paved. Then comes the iron work; first three 50 foot spans of 30 inch iron plate girders, succeeded by two 150 foot spans and one 160 foot span of what is known as a double intersection Pratt truss. The height of the truss in the 145 foot span is 18 feet 6 inches from center to center of chords, and that of the 160 foot span 20 feet. The western end of the 160 foot span rests on the first river pier, of heavy masonry, rising out of the river about 65 feet from the east bank. The 332 feet between this pier and the first arch of the mason work on the west side, about 150 feet from the west bank of the river, is spanned by a swing or draw bridge constructed on the same plan as the last three fixed spans on the east side of the river. The height of the truss in the draw is 30 feet in the center and 20 feet at the ends. The total weight of iron in the fixed spans and draw is 1,440 tons. The weight of the draw and turn table alone is 685 tons—95 tons of iron in the turn table, 440 tons in the draw, and 150 tons of planking. The large pivot pier (of course of stone) on which the draw turns, stands just at the edge of the west bank, partly in the water, and there is left between the two piers about 130 feet of clear water way. The draw, which although not the longest, is, perhaps, the heaviest in the world, is turned by steam, the boiler and engine being on top of the pivot pier and inclosed in an engine room built for the purpose. The great pile of masonry which constitutes the west side part of the viaduct, 1,379 feet in length, consists of ten arches—eight of 83 feet span and two of 97½ feet span—and retaining walls filled in with earth and paved. The retaining walls are between the two large arches. The remainder of the way up to Pearl street is partly an embankment and partly an excavation. In all, 80,500 perches of stone were used in the masonry of the viaduct. The river piers and the first nine arches on the west side have pile foundations, in the construction of which 277,000 lineal feet (between 55 and 56 miles) of piling was used. The approach to the draw on each side is to be guarded by safety gates, which will be closed when the draw is opened.

The floor of the draw is 68 feet above the ordinary stage of water in the river, while the elevation at the eastern end of the viaduct at Water street is 73 feet, and at the western end at Pearl street, 91½ feet, thus giving a light down grade from each end toward the draw. From Water street the grade descends toward the draw at the rate of eight inches per 100 feet; the entire length of the draw span is level, and from the draw to the western end of the masonry, a distance of 1,379 feet, the grade rises at the rate of 6 inches per 100 feet, after which an up grade of 2 feet 10 inches per 100 feet is maintained to Pearl street. Except on the draw the structure has a uniform width, from out to out, of 64 feet—42 feet of roadway, and an 11 foot sidewalk on each side. The width of the draw is 46 feet—a 32 foot roadway, and two 7 foot sidewalks. The roadway on the west side and on the retaining wall on the east side of the river is of blocks of the best quality of Medina (New York) sandstone, filled in with Trinidad asphalt and coal tar, of which latter articles nearly 3,000 barrels were used, making it perfectly water tight. The sidewalks on these portions are of Cleveland blue sawed stone. The roadway on the fixed spans is Nicolson, filled in with Abbot's cement, with a plank bottom. The draw is covered with a double planked floor. A double track for street cars is laid in the roadway, to be let to street car companies desiring to use it. The roadway has a crown of 6 inches, and as a whole the top of the viaduct is constructed and looks much like an ordinary street, the sidewalks being raised about six inches above the roadway, from which they are separated by curbing.

A tasteful iron railing, 3½ feet high, guards the entire length of each side, except for the first few hundred feet of the southern line on the east side of the river, against and above which rise business blocks, fronting on the viaduct in the same manner as if it were a street, and serving to heighten the substantial appearance of the structure.

THE PROPOSAL TO FLOOD SAHARA.

M. DE LESSEPS, whose activity puts to shame the strength and powers of endurance of men who have reached only half his age, has just returned from a short trip to Tunis. He had a double object in visiting the African coast; to bring home the remains of a brother who died out there, and to investigate the possibility and the advisability of letting the waters of the Mediterranean into the Desert of Sahara, so as to convert a great portion of that desolate expanse into an inland sea. M. De Lesseps says that the Arab chieftains of the south of the Aures keep up the tradition of there having existed in former times a sea in that neighborhood from 500 to 600 leagues in circumference. He also has been enabled to disprove the idea that the formation of a new lake would do away with the oases, for he has discovered that these are all from 15 to 40 meters above the level of the sea, whereas the desert itself is below that level. Traces of Roman civilization—where did not those wonderful colonizers penetrate?—have been found in the desert, and among them the remains of an amphitheater like that in Rome.

ORIENTAL STYLE AS APPLIED TO FABRICS.

HOWEVER readily we may accord to other nations the palm of superiority in works of art (and that we only do when speaking generally and in a popular sense, and not by any

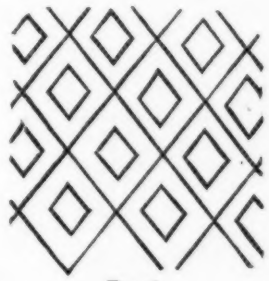


FIG. 1.

means when regarding the higher walks of art), we may openly defy all Christendom to beat the Anglo-Saxon in what is termed mechanical skill. But this same mechanical skill has of late years seen a rare development in England, as well as in America. And the world has latterly become

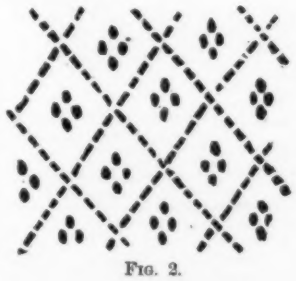


FIG. 2.

somewhat fastidious, and regards the vast accumulation of inappropriate stock that crowds our warehouses with a well-merited want of confidence, so that it appears our skill as manufacturers has been misdirected; but such skill is none the less a reality, although at present diverted from its proper channel. The fact is, we have hitherto bestowed more attention on the merely mechanical part of industry than we have upon the beauty or tastefulness of the article made. We venture to say that the Briton's conception of the beautiful, his innate sentiment and natural predisposition, is not altogether at fault in this matter. Possessing within his

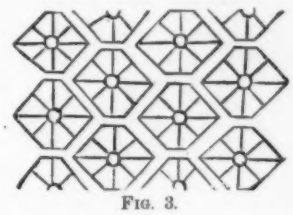


FIG. 3.

rock-bound home natural scenery of a rare beauty, descended from a race whose literature and art will live to the end of time, viewing the edifice of his splendid civilization, we cannot account him wanting in the main elements of artistic thought. We may, however, safely affirm that his discipline has not taken the proper form and moved in the right direction. The less busy and more contemplative life which a study of nature—that source of all that is chaste and harmonious—involves, is perhaps hardly within the reach of

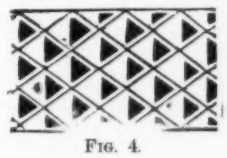


FIG. 4.

our modern designer. But it can only rarely be said that a man has absolutely no time for the cultivation of matters concerning the higher paths in his profession, especially now that education has become a recognized necessity. Yet we fear that amid this general thirst for knowledge much misapplication of time may be the first result, though it is probable that things will work right in the end.

Intellectual equality is a thing as impossible as social equality, although the two are often relative in their measure of man's progress. It has been said by one of our most

FIG. 5.

eminent statesmen, and perhaps for the thousandth time in the world's history, that singleness of aim produces the greatest results; and such is proved over and over again by our Eastern designers, some of whom spend years, we might say, industriously contemplating nature. We use this expression advisedly, for we see no reason why industry and contemplation should be regarded as antagonistic qualities. By these means, thought, suggestiveness, and spirit are worked into design. The object, of necessity, becomes fraught with interest, like a well-written story, appealing to human passion and human sentiment. It is probable that

FIG. 6.

our schools of art, and various similar institutions, turn out pupils unrivaled in their accuracy of delineation. It is not only probable, but certain, that so far as drawing is concerned, England's sons are second to none throughout the wide world. But, again, this excellence is chiefly mechanical. A man may be ever so good a draughtsman, and yet not be a designer. What we wish to show, then, is that our most direct course towards textile art improvement lies along the straight path of intelligent observation—first, of nature, and then of the best examples that past times have handed down to us; at the same time, regarding as only of secondary importance those mechanical aids towards public

FIG. 7

technical knowledge which the awakened enthusiasm and mistaken good nature of the age have dignified by the name of education. Of course, "hewers of wood and drawers of water" we must always have. Their presence is necessary to the existence of the state. Were it possible to train all men up to be artists, such a course would be unwise. Still, there is nothing unwise in giving men all the art information that their time and means admit of. But the improve-

ment of taste in textile fabrics is less a question of the cultivation of the mass of our workmen in art or science, than of raising the standard among the particular few who construct our designs and superintend the management of our fancy concerns. True, these men must have some encouragement from an artistic public in order to sustain their efforts; and as such encouragement becomes general, so will the intellectual and social position of our designer be elevated, and his calling become more respected among

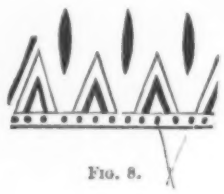


FIG. 8.

intelligent men. In past times we have seen what results attended the emigration to England of various bands of Flemings in the reigns of Edward III. and Elizabeth. Other forces for the encouragement of trade, which we cannot now enter upon, were no doubt at work in the same direction; but it is sufficiently clear from these immigrations that the efforts of skilled workmen have a sensible effect in creating a special demand, and stamping their mark upon the age. It remains, then, for our designer to concentrate his attention upon the highest forms of his art, and to avoid the diffuse and mediocre treatment hitherto encouraged by people who regard textile manufactures as mediums incapable of conveying artistic thought.

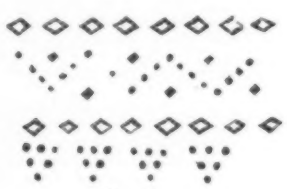


FIG. 9.

After these few general remarks, having a most important bearing upon the subject, let us proceed with our task. Among the Indian fabrics—particularly those of the Madras Presidency—we find the following three armures (Figs. 1, 2, 3) very common.

It must be understood that these do not form what is called the design of the piece. They are generally used subordinately (as mere methods of working the ground) to some larger figure not formed from straight lines, but partaking more or less of free curvature. It will be obvious to the reader that these modes serve to break the monotony

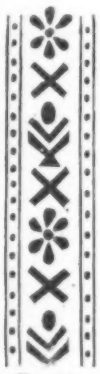


FIG. 10.

of, and at the same time add to the rich appearance of the cloth. In large surfaces, where the principal ornaments are far apart, perhaps it is wise to indulge freely in this application of the armure method of treading. The rigid evenness and regularity of the ordinary plain weave is altogether too inane for a spacious Eastern garment, and hence the necessity of adopting a little variety in the treatment of such cloths. The use of the armure pattern, in its strictly geometrical character, should not infringe upon or invade the proper province or design, but is most in place when worked in self-colors or tones, with the simple intention of adding a little relief to what otherwise might look bare and uninteresting.

FIG. 11.

Figs. 4 and 5 represent two modes often employed in weaving gold wire mentioned.

Figs. 6, 8, and 9 are edgings for borders. One of them, Fig. 6, may be well adapted to English textiles, though, as drawn on paper, they appear somewhat stencil-like; yet, in a certain degree, this effect is permissible in Indian styles. If it is required to make them bend to English notions, the large central ornaments may be worked alternately in bright colors, while the remaining parts are made in tones of one color assimilating with the ground. Figs. 7, 10 and 11 are stripes, and these may be found repeated in many ways among French goods. But in their purity one might have

FIG. 12

seen them in the Indian Court of the late Exhibition, with blue, orange, or scarlet as the leading color.

The simple chevron patterns are worked in black and orange, and the four ends at the edge are of black, worked with four others of orange, end and end.

Fig. 13 is much more of a figure, technically speaking, than the preceding ones. For fine mohairs, Japanese silks, and poplins, this design is always in good taste: but it needs a fine set in order to show to advantage.

In order to create a little novelty, the ground of the cloth might be interspersed with small Indian letters. This would lessen the set appearance of the pattern, and form at the same time a harmonious accompaniment. Want of space

FIG. 13.

prevents us going further into the merits of Indian style, and, as we intended touching upon the subject of Japanese ornaments, we must bid farewell to our friends the Indians.

The principal specialty about Japanese design, and in which they are ahead of all other races, even the Persians and Greeks, is the fine susceptibility displayed in their curves. The nervously wrought stems and drooping leaf formation in Fig. 13 are pretty. One would scarcely think that frail flowers, leaves, and grasses could be depicted in such a forcible manner. There is nothing coarse or vulgar in this design. It is a genuine study from Nature, attempting only to portray the true and the beautiful.

The grace and majesty that move in silent force through

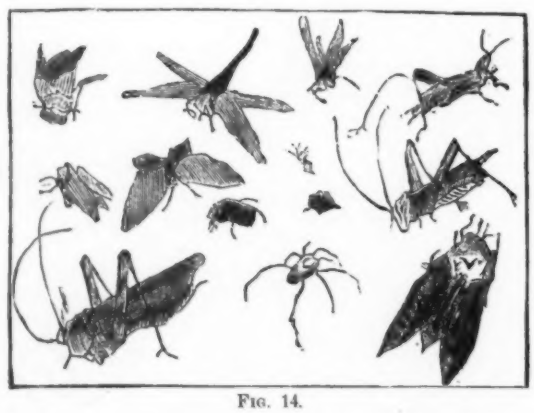


FIG. 14.

Nature's kingdom appear even in her smallest works; the pretty wayside flower, in charming innocence bending at our feet, tells of a mystic tie, a last link of faith, that binds artificial man to his long-forgotten Creator. And so the morbid child of flesh must ever return for inspiration to the lap of old Nature, the prolific mother of everything that is lovely, and whose beauties, though sunk in years, are still fresh in eternal youth.

Fig. 14 is from moth and insect life, and forms an interesting tableau. Among the most common Japanese ornaments, taken from Nature, are to be found the figures of the stork, peacock's feather, kaido flower, and bamboo leaf. The more artificial ornament, a little boat, differing from the junk of the Chinese, is also often seen in Japanese goods. The works of this wonderful little people prove that they are imbued with an intense love of Nature; possessing also a keen appreciation of the humorous and grotesque, and having some satire and much spirituality. Their allegories are frequent and witty. Their mythological studies are ingenious. Their imagination is powerful, but held strictly under control by a marvelous accuracy of judgment; and all their works bespeak a refined and active intelligence.—*The Textile Manufacturer.*

WATERPROOF SOLES.

WATERPROOF soles which are either inserted into ordinary leather soles or laid into the boot are prepared in Germany as follows:

A mixture is prepared, consisting of sixty parts of rosin, eighty parts of tallow, five parts of wax, and five parts of turpentine. In this mixture linen is soaked. This is thereby rendered watertight. The sheet of linen is then united to a sheet of wool by being passed through rollers. On the linen side the sole is now covered with a solution of glue, to prevent the resinous surface from sticking to the stockings and shoes in walking.—*Deutsche Industrie-Zeitung.*

A NEW METHOD OF DECORATING PORCELAIN WITH GOLD.

A NEW method for decorating porcelain, where gold alone is employed, has recently been invented by M. Réjoux. Formerly, when porcelain was decorated with gilding alone, the ornamentation was limited to the production of a pattern by the greater or less relief of the gold, and by its being burnished or left dead. Even the thinnest part of the gilding was opaque. No delicate effects could be produced, and the style was suited rather for an abundant display of barbaric wealth than for refinement of expression. The new process enables the gilding to be put on so thinly and transparently that the most delicate effects of light and shade can be produced. It is, however, applicable only to vases of *gros bleu* color, that is, to vases colored with oxide of cobalt. Upon this ground the pattern is drawn with a pigment composed of oxide of aluminum. This is then subjected to a firing which fuses the oxides together, and a brown surface results. This surface is found to be more suitable than any other known for the reception of the gold paste, which can be laid on in a thin film, and then, further, by subsequent removal, can be made to give great transparency. This property of the brown surface is not destroyed by being tinted before the gilding, so that it is possible to tint it with different colors which shall show through. A further variation is frequently obtained by changing the tone of the gold by mixing it with alloys. This admirable effect of transparency has not hitherto been produced by any other means.

ELECTRO BRASSING AND BRONZING.

WE extract the following very interesting information from a recent article by Mr. Alex. Watt, in *Forge and Lathe*:

When cast iron work is to be brassed, it must be first immersed in the potash bath (which should always be used boiling hot) for a short time, to remove greasy matter; it must then be rinsed, and afterward placed in the pickling bath. After half an hour's immersion, the article should be again rinsed, and well brushed with sand and water. If the black scale does not readily brush off, again place the article in pickle for a short time—indeed, until the oxide is easily removable. When thoroughly clean by brushing, again rinse well, and suspend the article in the depositing bath. Cast

iron always receives an electro deposit of any metal with great difficulty; it is necessary, therefore, to assist this sluggishness by increased battery power, otherwise a very poor, irregular coating will surely result. The current must be brisk for coating cast iron with any metal (not excepting copper, which is the easiest of all metals to deposit upon this class of work), but more especially in electro-brassing.

All things being equal, the characteristic tint of brass should present itself upon the surface of the work almost immediately after immersion in the bath. If this be the case, the action may be allowed to continue for a few minutes, or until a perfect film is obtained, when the energy of the operation may be somewhat diminished by raising the anode out of the bath a few inches, so as to expose a smaller surface (in solution) to the article to be plated.

There is always a brisk effervescence in the brassing bath when deposition is taking place, owing to the intensity of the current required for this purpose; and unless the evidence of activity shows itself, the probability is that brass of a good color will not be deposited. After the first thin coating is effected it is a good plan to remove the article from the bath, and if any defects present themselves, from want of proper cleaning, or otherwise, let the article be well brushed with sand, as before, and, after rinsing, placed in the bath until sufficiently coated.

Articles which have received a stout coating of brass may be "dipped" in the ordinary dipping acid (a mixture of sulphuric acid, nitric acid, and water, with occasionally a little nitrate of potash), which is to be procured ready made at the drysalters. Electro-brass articles thus dipped may then be lacquered in the ordinary way, that is, by gently warming the article and then brushing it over with a thin coating of gold or brown lacquer, according to taste.

Zinc articles receive a deposit of brass very readily, and generally speaking, the deposit is of a very good color, if the solution bath is in good order. In preparing zinc work, however, after it has been submitted to the potash bath for a short time and rinsed, it must be immersed, for a few moments only, in a pickle composed of hydrochloric acid, 1 lb., and water, 1 gallon. The work should then be brushed with silver sand and water. As zinc receives the deposit so readily, however, it will be necessary to expose only a moderate surface of anode to commence with, otherwise the operation will be too rapid, and the work liable to strip. It is not often necessary to remove zinc articles from the bath to examine them if they have been well prepared beforehand by scouring with sand, as described, until they are sufficiently coated. There will be no harm, however, in lifting the work out of the bath for a moment to ascertain if all parts are properly clean, but it should be promptly returned to the bath before the surface has time to be acted upon by the atmosphere.

Steel articles also receive the brass deposit very readily when the solution is in good order, but the deposition must not on any account be allowed to take place rapidly, otherwise the work will strip, to a certainty. A little practice will soon enable the operator to regulate the speed of his deposit to the class of work in hand, provided that he bears in mind the rule we have suggested for his guidance, namely, that deposition should begin almost immediately after immersion, but not too suddenly. Lead, pewter, Britannia metal, however, do not so readily receive the deposit, owing to their inferior conductibility. This class of work, therefore, must have vigorous battery power and a good surface of anode exposed when first placed in the solution; and when the deposit has taken place fairly all over, the power may be somewhat diminished, and the article allowed to remain undisturbed until finished. It is not a good plan to disturb the solution more than can be helped when lead or Britannia work is in the bath. Again, while this class of work is in solution, no other articles composed of a different metal should be immersed in the bath. For example, if steel or iron and lead articles are placed in the bath at the same time, it is not unlikely that the former will receive the deposit too quickly, while the latter may not be coated at all, or only partially so. If, however, it is not convenient to devote the bath to one metal only, the safest plan is to place the lead or pewter articles in the bath first, and when these have become coated, the steel or iron work may be suspended, on the same rod if necessary—taking care, however, to keep them as far apart as possible.

In brassing fender and stove work, which unfortunately is generally required to be done at a very moderate price, the object is to make the article look as well as possible with the smallest amount of metal. When we consider that fenders are sometimes electro-bronzed for two or three shillings each, it is not possible, with the labor required to make them look well, to give more than a mere film of deposit. This may generally be done in half an hour, or even in less time, if the current is vigorous and the solution in good order. After pickling and scouring with coarse sand and water, the fender or stove should be rinsed, and examined to ascertain if it be sufficiently clean for the bath. As soon as the article is coated well all over, it is to be rinsed in boiling water, and then placed in hot sawdust (mahogany sawdust is the best for this purpose) until required to be bronzed. The operation is done as follows:

Having made up a thin paste of black lead and rouge for warm bronze, to which may be added a small quantity of sulphide of ammonium, that is to be laid well over the article with a soft brush, taking care to cover every crevice, now place the article before a fire until nearly dry. It is then to be briskly brushed over with a large soft brush until quite bright, and all the loose powder removed. With a piece of leather placed on the forefinger and slightly moistened, touch up the prominent parts, or "high lights," by rubbing until the metal becomes visible at those points. If this is done artistically, a very pleasing effect of light and shade will be produced. The fender or stove front should now be made moderately warm, and a thin coating of methylated varnish brushed lightly over it. In a few moments after, the varnish will be dry, and the operation complete.

When the yellow bronze, or more properly, brass, is deposited on work of this kind, the green bronzing powder should be used, with the addition of a little sulphide of ammonium. In very high class work, the solution of chloride of platinum may be substituted for the ammonium salt. The tone of the bronzing may be varied greatly by applying more or less rouge for the warmer tint, or by increasing the proportion of plumbago and sulphide for the darker tone. The addition of yellow chromate of lead will impart a greenish tint to the brass deposit, which is very pleasing in some patterns.

LINES of underground telegraph wires are now in successful operation throughout the whole distance—1,210 kilometers—between Strasbourg and Kiel.

HERRING'S PRINTING TELEGRAPH.

THIS instrument, which has caused so much discussion of late, is constructed to print the dot and dash of the Morse alphabet in such a manner that one can never be mistaken for the other. The following is a key to the Postal Telegraph Alphabet, as printed by Mr. Herring's system:

This is effected by the use of two distinct levers—an arrangement which permits the dot and dash to be printed vertical instead of longitudinal, and to be produced instantaneously instead of by continued pressure, thus saving the time of the operator and very considerably diminishing the length of the message slip. The coil of paper on which the message is received is made to travel by clockwork in the ordinary way. It passes directly over a thin metallic disk placed transversely to the course of the slip, revolving on an axis and dipping into an ink well. Over the paper is the lever terminating in a broad style placed vertically above the disk so that the descent of the lever compresses the slip of paper between the disk and the style. The central portion of the lever carrying the central portion of the style can be acted upon either independently of the lateral portions or together with them. In the one case only the narrow central portion of the style descends, and the slip of paper is pressed upon the inking disk at only a single point of contact, which produces a vertical dot, and in the other case the style descends as a whole, and having a concave edge it presses the paper into contact with the disk, thus producing a vertical dash. The pressure of the style stops for the moment the revolution of the inking disk, upon the immediate recommencement of which the ink supply depends.

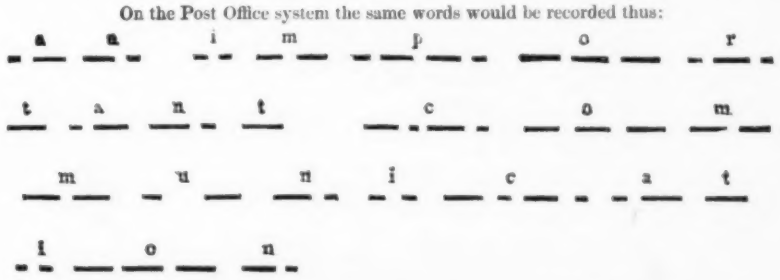
Mr. Herring has, therefore, placed upon the axle of the disk a box containing a spiral spring, so arranged that when the disk itself is checked, the power of the clockwork coils the spring. The moment the disk is released the coiled spring gives the necessary impulse to produce immediate revolution. Each lever also serves to clamp the paper at every impression, thus insuring perfect clearness and regularity in the signs.

The operator is furnished with two keys, one of which commands the central or dot portion of the lever and the lever as a whole. One therefore produces the dot and the other the dash, and no mistake can occur between the two except by the use of the wrong key. The printing is remarkably clear, distinct, and compact, and gives a legibility to the messages which no other modification of the Morse system has ever attained.

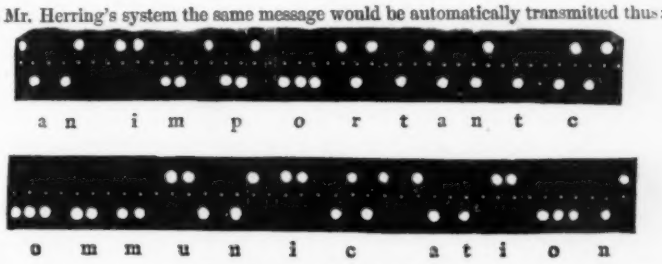
The utility of Mr. Herring's system in transmitting and recording messages may be partly perceived from the following comparison between it and the system of the Post Office.

On Mr. Herring's system a message would be recorded thus:

On the Post Office system the same words would be recorded thus:

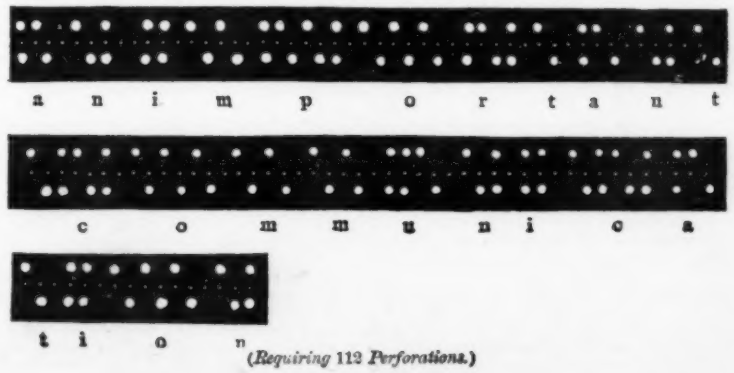


On Mr. Herring's system the same message would be automatically transmitted thus:



(*Requiring only* 56 *Perforations.*)

On the Post Office system the same message would be automatically transmitted thus:—



(*Requiring* 112 *Perforations.*)

Mr. Latimer Clark has made a report upon Mr. Herring's system, from which we extract the following:

1st.—We are of opinion that your instrument will work on all ordinary circuits at a greater speed both for hand and mechanical sending than the ordinary Morse now in use, in consequence of the dashes being made in the same space of time as the dots.

2d.—In comparison with the Morse the signals given by your instrument are necessarily more legible, and may be more accurately deciphered, in consequence of the dashes being upright, and of uniform size and character. Owing to the vertical position of your dashes, it is impossible for a clerk to be in doubt as to which are dots and which are dashes, as is so liable to occur with the ordinary Morse writing.

3d.—Owing to the contacts for dots and dashes being alike, ordinary telegraph clerks can learn to work your instrument with greater facility than they could the Morse.

4th.—There is no doubt that the saving in the cost of paper for your system is very considerable, and would form an important item of economy in a year's work. This saving would probably be equal to sixty-five or seventy-five per cent. The compactness of the messages by your system is very remarkable.

5th.—With reference to mechanical sending, the punched paper used for your system is more simple than that required for the ordinary Morse, and it is also stronger, owing to the fewer perforations—exactly half the number required for the Morse signals.

6th.—Your instrument is peculiarly adapted for reading by sound.

There is of course some inconvenience in having several kinds of instruments in common use, and the addition of one more to the present number is to that extent objectionable.

The insulation of the lines in this country is, however, now so excellent, and the advantages which your system affords are attended by so few inconveniences, that we think your instrument might at once be employed on many lines with decided advantage.—*Telegraphic Journal.*

NEW USE OF ELECTRICITY.

THE French Minister of Public Works (according to the *Moniteur Scientifique*) has been experimenting on the River Lot, in Aveyron, with an electric apparatus designed to reproduce automatically, from a higher to a lower point of the river, the variations of level, so as to give immediate warning of floods, and enable the inhabitants to make what preparation they can. The experiments were made between two points about a mile apart. At the higher Laroque, is a float which follows the upward and downward motion of the water (without being affected by the current). It communicates its movements, through a battery and conducting wire, to the needle of a graduated scale at Capdenac, the lower point, and the needle thus indicates all the fluctuations of level. At a certain point on the scale is the word danger,

and when the needle reaches this, it sets in action a number of bells in the houses on the banks, connected by wire with the instrument. Thus the inhabitants are warned to make ready. This curious apparatus is the invention of M. Gros, of Rodez, and it has met with high approval from the Ministry of Public Works and the General Council of Aveyron. The need of something of the kind has been strongly felt, as floods in that region have proved very disastrous.

EFFECT OF THE MOTION OF THE AIR WITHIN AN AUDITORIUM UPON ITS ACOUSTIC QUALITIES.

By W. W. JACQUES, Fellow in Physics of the Johns Hopkins University.

IT is the purpose of this paper to give an account of some experiments made for the purpose of determining the effects of the currents of air within an auditorium upon its acoustic qualities. These experiments are in three series, the first being a laboratory investigation into the effects of currents of air upon a ray of sound, the second and third, studies by different methods of the effects of the currents of air in a lecture hall and a theater upon the waves of sound.

Since the air of a hall is the medium by which sound is conveyed from the speaker or singer to the hearer, it would certainly seem of fundamental importance that this air should be in the condition best suited to the propagation of sound. Experiments made by the author in a considerable number of halls show that the atmosphere is almost invariably disturbed by currents of air of varying density crossing the room in all directions. These currents have been traced out with thistle balls, and their velocity measured with the anemometer. The estimates of density have been made from the velocity of motion. Now the experiments of Professor Tyndall have shown that currents of air of varying density form one of the chief obstacles to the propagation of sound waves. The author, in repeating these experiments in a somewhat modified form, found that such currents of air not only decrease the intensity of a sound wave, as Professor Tyndall has shown, but that they actually modify its form, and so give rise to great indistinctness. The experiments were made as follows:

At A was placed a source of sound,

$$A + - + - + - + - + E,$$

being in some cases an organ pipe, in others, a man who spoke in a clear and distinct voice, and in others, various musical instruments, on which simple combinations of notes were played. Just below the points, + +, etc., were placed substances heated to such temperatures as to give rise to currents of air corresponding in density to those found in an auditorium. At E was placed the ear, which, though it be not so reliable an instrument as the singing flame of Professor Tyndall for estimating intensities of sound, is, of course, the best instrument imaginable for determining their qualities.

The results of the experiments were as follows:

The ear being placed at E, and a small lead organ pipe, blown with a constant pressure of air, at A, the heated bodies were placed under + +, etc. A very decided decrease in the intensity of sound was noticed, but it was also noticed that the previously clear note lost its *distinctness*. The pipe was removed, and a man was placed at A, who spoke in clear and well-defined tones. The effect was not only to decrease the intensity of his voice, but to make it slightly confused and indistinct, as if each syllable were repeated several times in very close succession. When a flute was substituted for the voice, the effect was the same. The effect on a violin seemed to be considerably less. With a drum, no effect whatever was observed. The effect seemed to be most marked on the man's voice, or a musical instrument in which the overtones were comparatively small. The explanation of this is very simple. The original ray of sound, striking upon the first current of air, is partially reflected and partially transmitted. The loss of the reflected portion causes a decrease in the intensity of sound. The transmitted portion, striking upon a second current, is likewise divided, and its transmitted portion continues to be so divided as many times as there are variations in the density of the air. Its reflected portion, as well as that of all the succeeding reflections, instead of being wholly lost, is interrupted in its backward course by the first current of air, and reflected along the path of the primary wave, but following it at an interval of time, depending upon the thickness of the current of air. Each reflection being thus again and again reflected and divided, we have, following close upon the primary wave, a multitude of secondary waves, which, falling upon the air, greatly mask the distinctness of the original sound.

Currents of air of varying density, then, cause, first, a *decrease in intensity* of sound, and, secondly, an *indistinctness* or confusion of the sound.

That currents of air which we have thus studied in the laboratory act in the same way in an auditorium, may be shown by the following experiment, in which the sound waves may be actually traced out in space, and their confusion, consequent upon the introduction of currents of air, likewise shown:

Near the middle of a lecture hall, 92 feet long and 65 feet wide (the hall of the Massachusetts Institute of Technology, in Boston), a heavy plank, six feet wide and twelve feet long, was set on one end and firmly fixed. Eight feet from its middle point, on one side, was placed a B 4 stopped lead organ pipe, which was so connected with a gasometer as to be blown with a constant pressure of air.

On the other side of the plank, and within the sound shadow, a system of co-ordinates, in a plane parallel with the floor, was established, by means of light wooden rods which ran parallel and perpendicular to the board, and their length divided into centimeters.

Now it has been shown by the author (*Proc. Am. Acad. Arts and Sciences*, May 10th, 1876) that rays of sound diverging from such a source, and being diffracted around the edges of the board, will, when they meet each other, after having passed over paths differing by a half wave length, neutralize each other and produce comparative silence. By moving a B 4 resonator, connected by means of a rubber tube with the ear, along these co-ordinates, the points of interference are easily detected, and are found to be situated as predicted by formulæ similar to those used in the diffraction of light. In fact, the cases are entirely analogous.

We have here, then, a means of mapping out the positions of the sound waves in space, and can say that at one point there is silence, because two sound waves have met crest upon the trough, and neutralized; at another, the sound is loud, because two waves have met, crest and crest, and trough and trough, and have doubled. All this is true so long as the air of the hall is at rest, and these experiments have been made with doors, windows, and registers carefully closed.

Everything being in this condition, and the sound waves having been mapped out, the doors and windows were thrown open to the winter's air, and the registers were opened to admit as many streams of air heated to nearly 100° C. What is the effect? Currents are rushing about the hall in every direction (we have the conditions of the laboratory experiment), the waves of sound are superimposed by numberless reflections whose points of condensation do not coincide, and the phenomenon of diffraction instantly disappears. This experiment was many times repeated, and always with the same results.

It is evident, then, that, in order to procure the proper propagation of sound, we must do away with these air currents. It must be remembered, however, that, when large numbers of persons are crowded into halls, the air within is usually subjected to very considerable disturbances in order to obtain even indifferent ventilation. How, then, shall we obtain the desired ventilation, and at the same time prevent the formation of currents of air?

The solution of this problem seems to me to be given in the third series of experiments, which were carried out in the Baltimore Academy of Music, designed by Mr. J. Crawford Neilson, architect, of that city.

The ventilation of this house is so arranged as to prevent largely the formation of air currents of unequal density. According to a survey, made with thistle balls and the anemometer, of the space contained within the walls of this theater, the movement of the air is as follows:

The whole supply of fresh air is admitted at the back of the stage, is there warmed, then crosses the stage horizontally, passes through the proscenium, and then, somewhat diagonally, toward the roof, across the auditorium, in one grand volume and with gentle motion so as to almost entirely prevent the formation of minor air currents. It is exhausted partially by an outlet in the roof, and partly by numerous registers in the ceilings of the galleries. From this central outlet and from the large flues of the registers the air passes into the ventilating tower over the great chandelier, which supplies, in its heat, a part of the motive power of the circulation. It is further expelled from the tower by means of large valves, so contrived, that, while they offer no obstacle to the *egress of air*, they completely *deny it entrance*.

The amount of air so passed through the house is, as determined by a series of experiments, about fifteen thousand feet per minute. This amount, sufficient to ventilate the house, is just what seems to be required to impress the proper movement on its atmosphere. That it is amply sufficient for ventilation, is shown by the fact that the thermometers of the upper circle do not vary perceptibly from those of the orchestra circle.

The seating capacity of the house is about sixteen hundred persons. The acoustics are, if we may judge from the testimony of a large number of singers and speakers, as well as from our own observation, among the best.

The weakest voice is audible to every seat in the house, sounds, such as a sigh, a kiss, or even the simulated breathing of the somnambulist, may be heard in the most distant parts, and all effects in music are exactly rendered. All singers and speakers agree in describing the facility with which the voice is used on this stage.

It now remains to show that the universally acknowledged acoustics of this house are largely due to the *condition of the air*, and not to the arrangement and material of the walls, together with other well-known causes of success or defect. For this purpose, persons have been repeatedly stationed at different parts of the house during a performance, without being informed of the nature of the experiments to be carried out. They have simply been asked to note, at intervals during the evening, the comparative ease with which they could hear the performers. At various intervals during the evening the valves which control the ventilation were reversed, so as to entirely interfere with the unbroken condition of the air, and give rise to currents of circulation. Almost invariably the testimony of the hearers would be that, at times corresponding to the interruption of the ventilation, the "sound was dead," was "confused and indistinct," and it would be observed that people all over the house would make an effort to listen. As an example of these experiments, the following is copied from the author's notes for the evening of January 24th, 1878:

There was a concert, consisting of orchestral music and solos, held in the house. At eight o'clock observers A, B, C, and D were stationed respectively in the orchestra, right and left wings of the balcony, and on the bridge that spans the stage above the level of the highest proscenium boxes. They were entirely ignorant of the nature of the experiment, and were simply requested to note the times of good and bad hearing.

At half-past eight o'clock the valves were reversed, and remained so till nine, when they were again set aright. After the performance, the following testimony was given by the different observers:

A.—Orchestra—to 9.15, very indistinct; 9.15 to 10, much better.

B.—Right Balcony—8.45 to 9.15, sound was dead; 9.15 to 10, decidedly better.

C.—Left Balcony—8 to 8.40, good; 8.40 to 9.15, confused; 9.15 to 10, good.

D.—Over Stage—8 to 8.30, good; 8.30 to 9, strong draught, hearing better; 9.10, draught disappeared.

An examination of this table shows that the observers in the auditorium found a period of half an hour's duration when the sound was not so plain as it had been before or was after. This time was of the same length, but from ten to fifteen minutes later than the period of interruption of the ventilation, but some time is, of course, necessary for the air currents to form, or, being formed, for them to be destroyed.

The observer, D, over the stage, however, found the hearing *better* during the half hour of interruption, and this is exactly what would be expected, for the interruption of the current of air through the auditorium causes it instead to rise directly over the stage into the large space in which hangs the scenery, and thence out of the building.

During Neilson's performance of *Rosalind*, observers A and B were stationed in the first and C and D in the second balcony from 8 to 10 P. M. At 8.50 o'clock the ventilators were closed, and the lobby doors, together with those leading from the lobby to the street, were thrown open.

Thistle balls let loose from the balconies showed currents of air coming in at the doors and crossing the auditorium toward the stage. At 9.20 the doors were closed, and ventilating valves set aright. The testimony of the observers was as follows:

A.—First Balcony—8 to nearly 9, good; for about half an hour, bad; afterward, much better.

B.—First Balcony—8 to 9, good; 9 to 9.30, bad; 9.30 to 10, good; strong current of air felt from the door a little before 9.

C.—Second Balcony—8 to 8.50, good; 8.50 to 9.20, bad; 9.20 to 10, good.

D.—Second Balcony—8 to about 9, good; 9 to 9.20, bad; 9.20 to 10, good.

In the foregoing paper we have studied the effects of air currents upon the acoustic qualities of an auditorium. That this is only one of the factors on which success depends, the author knows full well, and experiments are now in progress upon some of the other causes which modify the acoustic properties of churches, theaters, and halls.

These, however, have been in part studied before, while the above researches are believed to be entirely new.—*Journal of the Franklin Institute.*

[NEW PREPARATIONS.]

CONSTIPATION—ITS SUCCESSFUL CURE BY CASCARA SAGRADO.

By F. GUNDRUM, M.D., Ionia, Mich.

SINCE the history of man this morbid condition has annoyed and discomforted innumerable individuals, while in a great many it has become the source of great mischief, and in not an inconsiderable number it has actually been the cause of death.

The subjects of constipation have been, and still are, the subjects of much bad treatment, either at their own hands or at those of quacks, and sometimes of even regular practitioners. Usually the sufferer first tries home remedies, after which, in this country, he goes to the drug store and either subjects himself to the advice of an ignorant druggist or buys a patent medicine. These means failing, he consults a physician, and here, in too many instances, he is turned off in a few moments with a "favorite prescription." Generally, all the physician inquires after is how long the patient has been constipated, and how often he or she has an alvine evacuation. The question of making a correct physiological, pathogenic, or pathological diagnosis is entirely ignored. When one remedy fails another is tried until the whole therapeutical implements of attack are gone through with.

While infrequent evacuation, or constipation, is very prevalent, all who are thus affected should not be considered in a pathological condition. There are doubtless many individuals who have alvine evacuations only once in two, three, four, or even more days, and yet are in the realms of a physiological condition. Two individuals may have the same number of passages, and one be constipated while the other is not. Hence it will be seen that care should be used before prescribing to see whether we have to do with a normal or abnormal condition, and this is not always the easiest thing in the world to determine. It is often difficult to say where the physiological process ends and the pathological begins. This much may be said, however, that physiologically inactive bowels are much more prone to take on pathological action than where there is no such torpidity.

Now it should be remembered that what may be designated pathological constipation is not a disease in and of itself, but only a functional derangement of the alimentary canal. The causes and diseases on which this derangement depends are very various. The quantity and variety of food, the process of digestion, the quantity and quality of the secretions which are poured into the alimentary canal, muscular contractility of the intestines, abdominal walls and diaphragm, nervous enervation, quality and quantity of the blood, condition of sphincter ani, habit, etc.—these, with all general and organic troubles that may influence the proper and timely expulsion of the alimentary refuse, should be brought into view before prescribing.

The conditions I wish more particularly to call attention to in this article are muscular sluggishness of the intestines and an improper and insufficient supply of secretions. It is well known that, in order to effect the timely expulsion of the refuse material in the intestines, we must have sufficient muscular contractility, and that the fæcal mass must possess a certain moisture on its surface, or the intestine must itself be bathed with a moisture or secretion in order that the mass will glide along easily. If either one of these conditions fail the fæcal mass will certainly have great difficulty in making its passage, and its progress will finally be arrested in the large intestines. The bad effect of this arrest on the general system is well known to all medical men of any experience. The digestion must become impaired, and so with assimilation. The noxious materials absorbed from the fæcal mass materially and seriously affect the whole nutritive process and produce innumerable abnormal nervous phenomena.

Before giving my experience with cascara sagrado, I wish to relate two cases of obstinate constipation as showing what serious trouble may be produced, and how easily the difficulty was overcome by what I consider rational treatment, after every effort for several weeks previous had failed. Mrs. X., age 34, nervous temperament, was confined of her fourth child some time in December, 1870. She made a tolerable recovery, but was very costive for three months following. A month before I saw her in consultation only a few small scybala passed her bowels once in four or five days. Her abdomen became flatulent, she lost her appetite and strength, and when I saw her with Dr. C. she was confined to her bed. On exploring the abdomen I found in the left iliac fossa an oblong, hard, painless swelling, of about the size of a small child's head. Nearly, if not all, the laxative, hydragogue, and drastic cathartics had been used with much more persistency than success. I advised warm fomentations to the abdomen, manipulating abdominal walls, and injection of warm water by long rectal tube while the patient was partially inverted. By this method we succeeded in bringing away quite a quantity of dry, hard fæcal matter, but this treatment failed to improve our patient. There was but little change in her general condition, and the tumor diminished but slightly. It was during the second year that I had branched out on my own responsibility, and this case gave me the usual anxiety of a young practitioner's first difficult case. My library was as meager as my funds, consequently I had to rely on my wits. I prescribed for this patient one pint of good olive oil and one-sixth grain strychnia in fractional doses during twenty-four hours. By this treatment, provided my patient would retain it, I expected to soften up the hard fæcal mass and give tone to the muscular tissue of the large intestine. The result surprised us all; on the fourth day our patient began to have alvine evacuations. Their character was more like pieces of sealing wax, nicely oiled, than anything I could think of. These

evacuations continued in large quantities each day until the tumor entirely disappeared, and the patient rapidly recovered her health.

Case 2d. Mr. F. was habitually costive for some years, but during the last of November, 1873, he became worse. About the middle of December he took to his bed, and employed a "S. S. Curantur," who treated him homeopathically in every respect. He put him on low diet and opiates. The patient himself had noticed that there was a swelling forming in the right iliac fossa. He called the doctor's attention to it, and received the assurance that "that'll be all right." He was troubled a great deal with flatulency, and the doctor prescribed that the patient, several times a day, should reverse ends and give the gas in the bowels the advantage of gravitation. But this prescription failed. Another, and regular practitioner, was called in, and three weeks later I was called as counsel. Patient had become much reduced, and was unable to be out of bed, had flatulent distention of abdomen, loss of appetite, and very offensive breath. In the right iliac region there was a large tumor, nearly round, hard, painless, and immovable. The attending physician had diagnosed its fæcal impaction in the cæcum, in which opinion I concurred. The treatment ordinarily recommended in several of our best text-books had been used with good skill and perseverance, but little benefit resulted. The olive oil and strychnia were prescribed, with like happy result, as in the first case.

The treatment prescribed for these two cases is original with me, and the result was all that could be wished.

I have had under my care for the last three or four years a young lady who had been leading an absolutely sedentary life—not being able to walk a step. She has been the subject of obstinate constipation for many years, owing in all likelihood to poor health and sedentary habits. I had exhausted everything in the materia medica, with but temporary benefit. During the early part of last spring I saw, through some source which I do not now remember, a few reports of cases of constipation having been treated by cascara sagrado. I had been deceived by several new therapeutic agents, either owing to misrepresentation of the physician who lauded the remedy, or to being unfortunate in getting hold of a bad or spurious article of the drug, and was loth to try this. But as there was nothing more for me to try, I resorted to it. I ordered the fluid extract cascara sagrado in half teaspoonful doses, with some water or thin sirup, three times a day, with the instruction, should this fail to regulate her bowels, to gradually increase the dose. In two weeks I saw my patient. She looked well; had gained flesh, complexion was clearer than I had ever seen it, and she had a daily evacuation of semi-solid and moulded fæces. Cascara sagrado has acted beyond my expectations on this unfortunate girl, and so far has not disappointed me in relieving the constipation when it took place. Obtaining such decided and happy effects from a remedy, I concluded to give it an extended trial, which I have done. The cases are too numerous to report, and I can only give the general result of my observations. I have tried it in the young babe, in the child, adult and aged, and in nearly every case, with good results—better than with any one other remedy or combination of remedies I have ever used. I have generally given the remedy by itself so that I might know what cascara sagrado would do, though I have associated it with other remedies to advantage.

I have given this remedy to infants from half to a month old in doses of three to five or six drops once, twice, or three times a day, with good results.

The beauty of the action of the remedy is that it produces no griping and no exhausting effect, *e. g.*, a patient does not feel like he or she needed toning up after experiencing the effects of the medicine.

I have not as yet seen an attempt at explaining its mode of action by any one. So far as my individual opinion is concerned, I consider it a special tonic, affecting both nervous supplies, the pneumogastric and sympathetic, of the intestinal, if not of the whole alimentary canal. One seems to wield a decided influence over the secretions, while the other over the motion. Be this as it may, I shall consider this medicine as a special tonic to the intestines and a great addition to our materia medica until the contrary be proven by the experience of the profession or myself. I do not vaunt it as a panacea, but assert that it is one of the best, if not *the* best, remedies for constipation we possess.

The dose varies. In moderate cases I usually begin with fifteen to twenty drops two or three times a day and gradually increase till the desired effect is produced. In more obstinate or severe cases I begin with a half drachm. I usually give it before meals.

I have used the fluid extract manufactured by Parke, Davis & Co., which has proved reliable every time.

I also use cascara sagrado as a cathartic in preference to the usual remedies. It acts gently, promptly, and without griping.

CASCARA SAGRADO.

By J. H. BUNDY, M.D., Oakland, Cal.

BUT lately introduced to the profession, the physiological action of this drug requires further elucidation. Its tendency is toward the glandular system, especially the secretory. I believe it to be the peer, and in many cases the superior of chionanthus; its action in stimulating the secretions of the liver, bowels, and the entire alimentary canal is most satisfactory: it influences the ganglionic (vegetative) system, and through this stimulates all the organs under its control; it especially influences the portal circulation, and thus is explained its wonderful effect upon hemorrhoids. In giving it for this affection, it must be given in small doses, sufficiently small to fall far below catharsis. It increases peristaltic action by its tonic and stimulating properties upon muscular fiber, producing contractility and tonicity. When its properties have become thoroughly known its range of applicability will be found to be very wide. Were it a remedy for no other malady than constipation its value could not be estimated. In chills or remittent fever, doubtless owing to its action on the liver, it seems to act charmingly, and will prove a valuable adjunct in that direction. I have at the present time three cases of remittent fever, in which I never saw anything act so promptly and kindly, as a hepatic and antiperiodic, as the cascara. I give it in small doses: fld. ext. gtt. xx., every two hours, until it acts upon the bowels. With aconite and gelsemium, it arrested the disease in forty-eight hours. In cases in which there is jaundice, dry skin, scanty and highly-colored urine, with marked dullness, and tendency to coma, cascara has in my hands been a perfect success.

I am glad to notice the tests to which the profession is putting this drug, and hope that these tests will be continued, satisfied as I am that they will result in firmly fixing cascara in the materia medica. It is, however, in constipation and dyspepsia that I am disposed to place most faith in it.

The name, though vulgar, and of Spanish derivation (meaning sacred bark), does not affect its physiological action. I have sent such specimens as I have been able to obtain to Prof. Scudder, and hope he may be able to name it, as, without the flower, I am myself unable to do so. I trust we shall have further reports on the remedy from all sources.—October, 1878.

[NOTE.—Since receiving the above communication, cascara has been botanically located. It is the Rhamnus Purshiana.—ED. *New Preparations.*]

FLUID EXTRACT CASCARA SAGRADO.

By WILSON J. BEAN, M.D., Columbus, Ohio.

GENTLEMEN of the medical profession, I do not hesitate for a moment to raise my voice in favor of cascara sagrado, for constipation of the bowels, in every variety or whatsoever form that is sure to prevent itself to the intelligent physician for treatment. Through all of my professional years of active practice and experience I have been more bothered and perplexed with constipation than with all other diseases combined. With the field of medicine before me, and the knowledge to compound them in their various forms, I have not been able to accomplish a cure satisfactory either to myself or to the patient; and almost invariably such cases are ladies. I will now report one case of constipation, which was the worst I ever met with, that of a Mr. W——, living at 65 West Broadway, of this city, who had passed through the hands of two very intelligent resident physicians, the last of whom had pronounced the trouble cancer of the stomach, and had treated him three weeks for the same. The man declined every hour, and in fact at last failed to get any action whatever from the bowels, either from injections or medicine by the stomach, and was told he would die inside of twenty-four hours.

September 26th. I was called about midnight to hasten to his bedside immediately, as his son, a young man, said his father was dying. As I was not at home when he arrived with the message, I consequently did not get there until three o'clock in the morning, and the scene I witnessed on my arrival I shall ever remember. The room (which was large) was filled with people to witness the man dying, as they said; but they gave way to pass me through the throng at his bedside. I then proceeded at once to make a diagnosis of his case. With an explanation of what my professional brother had said and done, and seeing the medicine that was left, I immediately formed an opinion as to their course of treatment. Found my patient in the following condition: Feet and legs cold to his knees; hands and arms to his elbows; ears cold; nostrils drawn together, with a cold perspiration on his forehead; eyes sunken in their orbits, and of a yellowish cast, with complexion shallow, bowels severely constipated, so much so that, by placing the hands over the abdominal walls, the secretions could be readily observed, on pressure, in balls similar to walnuts; and a fever sore (or sores) on both limbs, of thirty years' standing. Being among the highest Masons in the order in the United States, his condition called forth much sympathy from a large circle of friends. I immediately ordered bottles of hot water, enveloped in flannel, placed to his limbs, and brandy internally until he revived, then I made the following prescription:

R. Fl. ext. cascara sagrado, ʒ ij.
Fl. ext. berberis aquifolium, ʒ j.
Ex. malt, ʒ ij.
Simple sirup,
Water, aa. ʒ j.

M. Dessertspoonful every four hours until the bowels moved, and then a teaspoonful three times daily.

This, as you will notice, was on the 26th September, at which time he had had no action from the bowels for eleven days. Three days were required for the above medicine to bring about a good action of the bowels, making in all fourteen days without an action.

In conclusion, will say, after he had taken the first dose of medicine he began to improve, and continued so to do until restored to health, and to-day is about his business in usual good health; and whenever he sees me he always hails me with "God bless you, doctor, that medicine did the work for me like a charm." In fact, the fluid extract of cascara sagrado is a boon to the medical profession, and will rank as one of the most important in the physician's prescriptions. I have others of your new remedies, of which I will report when time will allow me.

CASCARA SAGRADO.

By DR. S. W. FOWLER, Delaware, O.

WE know the profession has many members who are skeptical regarding the curative properties of medicines, and we content ourselves by the reflection that this class belongs entirely to those who have a limited knowledge of the science of medicine. The fault often lies in a lack of ability to correctly diagnose disease, and consequently failure to apply the proper remedial agent. It would be well enough for those who are skeptical regarding the curative properties of cascara sagrado in constipation to first carefully study the causes of the affection they seek to relieve. It seems useless to enumerate the many influences acting to bring about functional disturbance of the digestive organs which result in constipation. A careful study and investigation of the peculiar mode of living, the various occupations, the vicissitudes of life, cause us to cease to wonder at the prevalent deranged and altered intestinal secretions and torpidity of the liver. Inactivity of the intestinal glands, the many forms of nervous derangement, the pernicious habit of neglecting the daily call of nature to evacuate the bowels, and many other causes might be enumerated, but they readily occur to the careful and inquiring practitioner of medicine. A search for the cause of the trouble, its removal when found, followed by the administration of proper remedial agents, and there need be little trouble in bringing about a normal alvine evacuation.

I was induced to try cascara sagrado in a number of troublesome cases, and promised to report to the *New Preparations* the result of the trial. I have now for nearly a year used this agent in constipation of the bowels, ranging from the most mild to the most chronic and obstinate types, with the most satisfactory results. I have yet to note the first case of failure either in relieving or curing the trouble. The requested report coming from each individual case warrants me in pronouncing cascara sagrado a specific in constipation and a potent agent in functional inertia of the bowels. Its tonic effect on the gastro-intestinal mucous membranes and its stimulating influence on the branches of the sympathetic supplying the stomach and bowels are truly wonderful.

I have found the following a most potent combination:

R. Fl. ext. cascara sagrado,
Sir. simplex, aa ʒ ij.
Fl. ext. belladonnæ,
Fl. ext. ignatiæ, aa ʒ j.
Mix. Sig. Teaspoonful three or four times a day.

In simple constipation I found that cascara sagrado in twenty to forty drop doses, combined with sirup, three or four times a day and continued for some time, acted not only as a relieving but as a curative agent. When used for a few days and then omitted for a short time and then begun again, I found the curative action was more manifest.

Its being so pleasant to take makes it a favorite with children. I could give a large number of individual cases, with history, symptoms, and results of treatment, but regarding it entirely unnecessary, I will content myself by affirming that, after using it thoroughly and intelligently, all will regard it as almost if not entirely a specific remedy.

CASCARA SAGRADO.

By W. O. BUCKLAND, M.D., Oakland, Cal.

MY attention was called to this new but efficient remedy for constipation some months ago by my friend, Dr. J. H. Bundy, of Oakland, Cal. I have used it in quite a number of cases of habitual constipation, and with such uniform success that it seems to me nothing can possibly excel it.

Case 1. A gentleman, aged 52 years, of sedentary habits, consulted me on the 19th of September last, suffering with prolapsus and hemorrhoids of about eight years' standing. The usual history accompanied the case, viz.: had been treated by everybody and by every school. Complained, in addition to the local trouble, of a sense of mental and bodily oppression at times almost unbearable. Had a sallow complexion, foul breath, and scanty urine. Said he dreaded having a stool, it gave him so much pain, and either a severe headache or palpitation, so that he was unable to do anything more that day. Injections formerly helpful were useless now, and he frequently went four or five days without a stool at all. I determined to give cascara sagrado a trial in this severe case and test its virtue once more. I ordered,

R. Fl. ext. cascara sagrado,
Ext. malt,
Sirup simplex, aa, ʒ j.
Mix. Sig. ʒ i. four times a day.

Gave instructions to increase dose if necessary to procure one stool every day. I saw him five days afterward. He said the medicine for his bowels acted like a charm, and as the treatment had removed most of the pain, he had felt quite encouraged to persevere with it. The local trouble at this writing has left him, and he is finishing up the last bottle of cascara, taking one teaspoonful occasionally. Bowels are now regular, and the patient reports that he feels as well as he ever did in his life. I fear I have trespassed too much on your space already, or I could furnish you other cases equally interesting.

CASCARA SAGRADO.

By DR. C. M. GALLOWAY, of Xenia, O.

DURING the past year I have had ten cases of chronic constipation under treatment, aggravated by the almost constant use, for years, of compound cathartic pills and those so-called "liver pills," whose stereotyped testimonials of "marvelous cures" are so freely displayed and advertised among the masses, and occupy so prominent a position on the counters of the drug stores in our midst. A few of these cases I desire to report to you, and the beneficial results derived from the use of P., D. & Co.'s fl. ext. cascara sagrado.

Mrs. M. for fourteen years has suffered from rupture of perineum at birth of her last child, falling of the womb, and obstinate constipation, which had increased in its pernicious results upon her system during the past few years, until life was rendered miserable. In July she came under my observation, and I immediately put her on the following:

R. Fl. ext. cascara sagrado, ʒ j.
Sir. simp., water, aa, ʒ jss.
Sig. One teaspoonful after meals.

This treatment was continued for six weeks, when such favorable results appeared that the dose of one teaspoonful at bedtime was sufficient, and now she reports herself as only needing the remedy about twice per week. Her digestion has wonderfully improved, and her strength has returned, and she says she feels like another woman.

Miss B. has been under homeopathic treatment for two years before she came under my care, in August. For years she had suffered from dysmenorrhœa, dyspepsia, and constipation, and was regarded by her friends and attending physician as in a state of rapid decline. I put her on the same prescription of cascara sagrado as above mentioned in case of Mrs. M., and to-day she reports herself well. She has felt no symptoms of dyspepsia for more than one month, and the condition of constipation has entirely disappeared, and what to my mind is more gratifying, the dysmenorrhœa has yielded promptly to treatment, due chiefly to the general tonic effects of the cascara sagrado. She walks the street with firm step and the bloom of health upon her cheeks. She is elated with the results of the treatment, and her friends rejoice in having her restored to them in such perfect health.

BUTTON BUSH.

(CEPHALANTHUS OCCIDENTALIS.)

By A. J. ROE, M.D., Taylorville, Ill.

I DESIRE to call the attention of the profession to the therapeutical properties of "button bush," a new remedy introduced, or rather an old remedy lately brought to prominence to the profession by Parke, Davis & Co., and recommended for diseases of the air passages. I have used the remedy for a number of years in the form of a decoction or tea, and have found it to be a prompt and reliable remedy in amenorrhœa, dysmenorrhœa, and hypertrophy of the uterus. Should be pleased to hear the report of others who may desire to test its powers in such cases. In amenorrhœa, as in dysmenorrhœa, the patient should commence its uses in teaspoonful doses of the fluid extract three times a day up to the time the menses should appear. Should there be much pain it should be given as a hot tea every hour until the pain is relieved. A continuance of the remedy as before for two or three months will complete a permanent cure in all cases. It will give complete satisfaction where

everything else fails, and I do not hesitate to pronounce it as altogether the best remedy we have for the speedy relief and permanent cure of such cases. It acts as a tonic and diuretic. In cases where there is a weak condition of the whole system with a disposition to bloat, with sluggishness of the venous circulation, this remedy gives prompt relief, equalizes the circulation, removes the bloat, reduces hypertrophy, and accomplishes a cure.

SKIN GRAFTING.

By G. W. GARRISON, M.D., of Utica, Ohio.

[Read before the Knox County, Ohio, Medical Society.]

THE subject which I wish to call your attention to on the present occasion, Mr. President and gentlemen, is one with which I have had but a little experience, and I might say that our text-books have but little to say about it; nevertheless, I have had two cases in which it proved a positive success, when all other therapeutical plans failed in my hands, as well as in those of some other members of our fraternity. I was about to conclude that these unhealthy ulcers had become an excretory dyscrasia, as the first one almost healed, and then broke out again as bad as ever, seeming to say to me, in my first effort to cicatrize, thus far and no farther. I thought of making a second effort and availing myself of a new plan in treating extensive abrasions of the cuticle. My subject, then, gentlemen, is skin grafting.

You will say at once, doubtless, that the subject is altogether a surgical one. I answer, not necessarily so, as the physician must, at times, resort to the bistoury, scissors, bandaging, and small forceps which they carry in their pocket cases, in order to remedy some little trouble, while, at the same time, they make no pretensions to surgery. They can have their adhesive plaster, thumb lance, a small case of instruments to suit their own notions, in order to carry on successfully their plans in the healing art, but in all cases requiring surgical skill they would call to their aid one in whom they have confidence as a surgeon. Then, raising a small piece of epidermis with a pair of diminutive forceps, and severing it with a pair of scissors, without drawing blood, and transplanting this little slip into the abrasion where you wish it to take root and grow, could hardly be said to belong to surgical practice altogether. Now, this is all there is in skin grafting and the *modus operandi* pertaining to it, and any physician can avail himself of it in the treatment of large skin abrasions which he fails to make cicatrize by medicines or mechanical means, etc.; and one would rationally conclude if we did not give this treatment to our patient we failed in doing our whole duty. In order to facilitate, I will reduce my paper to one of a practical nature, if I can, by dividing my subject into three heads, viz.:—

1st. Cases requiring skin grafting.
2d. Plan of procedure.
3d. How long to continue transplanting.

I shall then report two cases.

First, cases requiring this treatment. I will preface by saying that we must have our patient in the very best possible condition, and our ulcer or sore correspondingly so. We can give our patient tonics, nutritious diet, morphia, to quiet night neuralgias in the sore. As regards the ulcer, if there should be indurated edges they must be removed by poulticing, alternating daily with pressure exerted with adhesive straps over the thickened walls or edges of the sore; and to make the ulcer healthy, I have often found Peruvian bark and creta preparation, with a small moiety of calomel mixed with it, sprinkled over the sore twice a day, will soon give the surface of the ulcer a healthy and florid appearance; at the same time all of the above therapeutical plans will cause the margins of the sores and abrasions to be on a level with the surrounding skin; at this period of our treatment nature will make an effort, as usual, to cicatrize; then is the time the second consideration of our subject begins.

2d. *Modus operandi* of skin grafting.

Pinch up a small amount of the cuticle from the inside of the arm with a small pair of forceps, and divide it with a small pair of concave scissors, being careful not to draw blood, and get the slip free from adipose tissue; insert this piece of skin into the granulations about one inch from the margin of the sore, and repeat in a similar manner until you have slips within an inch of one another all over the abrasion. The size of the piece of cuticle is not so material; the object to be attained is to have it grow; and it can't take root unless it be buried into the ulcer. A piece of skin the size of a pin's head is large enough. When the grafts are all inserted, dress the sore with an artificial scab, made of adeps porci, nine ounces, and thickened into a paste with English prepared chalk, twelve ounces, and spread over the sore and margins, retaining it there with a roller or adhesive plaster. Let this dressing remain on for three days, then redress by removing this artificial scab, and wipe the sore with a soft cloth. Right here, gentlemen, permit me to digress, by saying, never use any water in dressing old sores, for it seems to make them take on those horrible nocturnal neuralgias the night following. Then remove your paste carefully and wipe dry; wherever a slip has taken you will notice a small depression at that point, and if you think advisable you can insert other grafts, and dress as before, and so on, until cicatrization is perfected.

3d. How long to continue transplanting.

Until the sore is studded full of grafts, and the ulcer, to all appearance, about well. I would suggest, if the sore is on the lower limb, quietude in the recumbent posture, and the leg elevated, as any pressure upon the ulcer at this time would cause most serious interference with the new granulations, as well as destroy the newly formed cuticle within the sore, which resembles so many small islands in a body of water; these little islands of skin will meet the skin from either side, and thereby bridge the abrasion over. By carefully watching at this stage the new skin will become permanent, so that your patient may be allowed to go about. If the sore is on an upper extremity, the patient can have more liberty to go round. As regards the dietetic plan in these cases, as a general thing, the regimen should be articles of diet containing fat nitrogenized, and phosphatic combinations, together with milk and eggs. Stimulants should be avoided.

REPORT OF TWO CASES.

Mrs. B., aged sixty years, has had an indolent and irritable ulcer covering the dorsum of both feet and extending up the ankles, involving both malleolus processes, with indurated edges around both sores. This woman has suffered considerably, as her present physical condition shows, and she has tried a legion of remedies, as well as a goodly number of physicians, during her long period of illness, but all to no purpose, so far as giving her any permanent relief. The feet would, at times, under a soothing treatment, heal over about one half of the abrasion.

In December, 1875, her husband sent for me, and after taking in her situation and the character of the ulcer, I made the following prescription, viz.:—

℞. Phosphoric acid, diluted..... ... f. ʒ ss.
Glycerine, pure .. . .f. ʒ j.
Fowler's solution arsenic..... ... ...gtt. iij. M.
Sig.—To be taken three times a day after eating.

Locally I used elm poultices every six hours, for two days. Then I began my favorite treatment, in order to give tone as well as a healthy appearance to these sores, consisting of:

℞. Cinchona pulv..... . ...ʒ j.
English prepared chalk ... . ʒ j.
Hyd. sub. mur..... ....ʒ j. M.
Sig.—Dust the ulcer and margins over twice a day with this powder.

In a fortnight I had the pleasure of seeing the sore and the surrounding surface on the same plane, with all pain abated and my patient comfortable.

I then began skin grafting, by taking the slips of cuticle from her husband's arm, and inserted about twelve points in each sore at my first operation. I then applied an artificial scab, as before described, and incased the whole with a roller of bandages. I repeated the dressing in a similar manner twice a week, and inserted skin grafts, as I thought advisable, on each visit; in all I must have inserted not less than 100. At the expiration of three weeks I discontinued inserting grafts, because there had taken some ten or twelve points in various places in each ulcer; I simply used the artificial scab, with bandaging, and added one drachm of iodoform to each dressing. After six months' perseverance I had the pleasure of seeing both feet heal up entirely, and they remained so for about one year, when the right one broke out again, in consequence of a stick of wood falling upon it endwise, inflicting an incised wound, about two inches by one inch. This has not healed as yet, but she suffers very little inconvenience with her feet at present.

Case 2.—Mr. W., aged twenty-five years, had a large abrasion of the cuticle, about eight by five inches, caused by a contusion of the calf and the skin of the right leg. This sore had been discharging for something like a year or two, with no apparent hope of cicatrization. When I was called to take charge of the case I found the patient's general health good, but the sore was an extensive one. My first dressings, for three or four days, were chalk, Peruvian bark and calomel, as before described. I then wiped the sore dry and inserted five skin grafts, and dressed as in the first case. In three days I again inserted three more grafts. At the expiration of three weeks I had the pleasure of seeing the cicatrization perfected. This man went to work in less than six weeks, driving a team for one of our grocery men. His leg is still well.

Now, gentlemen, I have consulted no work before writing this paper, but simply aimed to give you a few practical thoughts in this connection, leaving out the author of this curative method, and not attempting to make any literary display, in the way of high sounding words or phraseology. You have, doubtless, all tried to heal old sores and large abrasions of the cuticle, and seen the skin almost cicatrize and then slough back; just where it begins to recede by sloughing, if you had previously inserted some grafts, you might have had the pleasure, in a short time, of seeing cicatrization completed. Then, so far as remedies are concerned, in the way of drugs, I verily believe that the various classes can be counted upon the fingers of our hands; but our therapeutics is not confined to drugs only, as this essay has tried to adduce or prove; hence we can launch out into a great field of research, and thereby make discoveries of other remedial agencies, which we can avail ourselves of in the line of our profession, and by so doing make our noble calling a science as well as an art.—*Med. and Surg. Reporter.*

PITURI—THE NARCOTIC OF THE AUSTRALIANS.

PITURI is the name of a narcotic indulged in by the natives of Australia. According to the London *Lancet*, the action of the drug has lately been investigated by Drs. Ringer and Munell. It is believed that the product is obtained from a solanaceous plant indigenous to Australia, and called botanically, *Duboisia Hopwoodii*. It is said that the natives fortify themselves during their long foot marches by chewing the leaves of the plant, just as the Bolivians employ for the same purpose the leaves of the coca. Dr. G. Bennett states that the pituri is a stimulating narcotic, and it appears to be used as a substitute for tobacco. It is generally met with in the form of dry and pulverized leaves. The natives first chew about a teaspoonful of them, then mix the mass with the ashes of some burnt twigs, and place the bolus behind the ear to increase its strength, after which it is again chewed and swallowed. When indulged in to excess, it is said to induce a condition of infuriation, and, in persons not accustomed to its use, pituri causes a severe headache. In a paper read by Dr. Bancroft, before the Philosophical Society of Queensland, in 1872, the author attributes the following effects to the drug. A period of preliminary excitement from apparent loss of inhibitory power of the cerebrum, attended in cats and dogs with rapid respiration, vomiting, and profuse secretion of saliva, irregular muscular action, followed by general convulsions, paralysis of the respiratory functions of the medulla; death or sighing respiration at long intervals; rapid respiration and returning consciousness; normal respiration and general torpidity, not unattended with danger to life. Drs. Ringer and Munell, from their recent experiments have arrived at the conclusion that the pituri alkaloid is remarkably similar to atropia—the alkaloid of belladonna, and that it is slightly narcotic, that it first salivates, then dries the mouth, and that it dilates the pupil when administered internally or applied to the eye. They further find that it is a powerful respiratory poison; produces general weakness and violent twitchings of the body. They show, too, that the alkaloid, through jaborandi, becomes allied to muscarin (the poison of toadstools), which possesses the same action as jaborandi, except that muscarin administered internally, contracts; but topically applied, dilates the pupil. By means, therefore, of pituri alkaloids can be grouped into alliances so dissimilar as atropia and jaborandi and atropia and muscarin, two alkaloids which in their effects are antagonistic to those of atropia.

A PROPOSED "INDEX MEDICUS."

IT is a fact perhaps pretty well known among medical men, especially those interested in the bibliography of their profession, that Dr. J. S. Billings, U.S.A., in charge of the National Medical Library at Washington, has the manuscript ready, and proposes to print, so soon as Congress grants the necessary appropriation, his great "National Catalogue of Medical Literature." This work indexes, under subjects and by authors, the books, pamphlets, and original papers in nearly all the medical periodicals of the world, including over 400,000 subject entries, and making ten volumes, royal octavo, of one thousand pages each. The value of such a work to physicians all over the world will be incalculable. As a continuation of this as yet unpublished work, it is now proposed to publish monthly, under the editorship of Dr. Billings and his assistant, Dr. Fletcher, a current medical bibliography, under the title of the *Index Medicus*. The editors expect no pecuniary reward for this, but undertake it solely in the interest of science. It is simply desired that enough subscribers be obtained to make the venture a success. It will be issued by F. Leypoldt, the well-known bibliographical publisher, 37 Park Row, and will enter all medical journals, and index the leading medical journals and transactions in the English and other languages.

CONIA IN ANISE-SEEDS.

ATTENTION had been called some time ago to the toxic effects caused by certain samples of anise-seed met with in Germany. Poehl examined large quantities of the drug with a view of detecting seeds of the poison hemlock, conium maculatum, which contain a poisonous alkaloid, conia, and are similar in shape to the anise-seeds. Although no conium seeds were found, Mr. Poehl nevertheless succeeded in obtaining a small quantity of conia from the anise-seeds. He explains this by the theory, that, pollen of the conium plant, which belongs to the same family (umbelliferæ) as the anise-plant, having been carried to flowers of the latter, a crossbreed might be formed, containing the constituents of both plants.

SIGNS OF SOCIAL PROGRESS.

DISCUSSING the marked improvement which has taken place during recent years in the conditions of life among all classes, particularly those that live by labor, the Philadelphia *Public Ledger* remarks that it is an agreeable sign of the times, and a proof of progress, that many things once classed as luxuries for the few have taken their place among the ordinary matters of life.

The manufacture and preparation of what the advertisements style "modern improvements" in houses, and the production of the innumerable articles which minister to the personal desire and comfort of the million furnish employment for other millions. Employment involves instruction. Instruction in letters, handicraft, and art is the promoter of human ideas and civilization. The lowest condition of humanity is the subsistence by the barest supply of necessities. It may almost be said that such a grade of life as is content with coarse food for the stomach and indifferent shelter for the body is prehistoric. Even among the savage peoples which have been discovered there has usually—perhaps invariably—been found a desire for ornament; food for the sight as well as for the mere animal appetite. The cultivation and elevation of this taste - the desire, however rude, for the beautiful is a human sentiment which distinguishes man above the brutes. It is among the most powerful of the agencies which conduce to his elevation. A thing of beauty, it is said, "is a joy." It is more. It is mental food, and its possession raises the community or the individual by whom it is possessed.

Some years ago, when the improvement of the condition of the very poor began to be seriously agitated in Europe, and the wealthy landholders undertook to better the condition of their tenants and dependents, a good hearted woman of wealth gave the cottages on her estate a thorough renovation. Floors were repaired or furnished, walls were whitewashed, and things made tidy generally. She rejoiced in her good work, and for a few weeks all went well with her plans. Visiting the houses, after an interval, however, she was horror struck to find the ceilings marked in waves with lamp smoke and the walls decorated with "charcoal sketches." She was indignant. The cottagers told her that the white walls looked "too cold like." They could not endure the monotonous white, and remedied the deficiency in their own way. The reform was then abandoned as hopeless. But matters since then have reformed themselves. These cottagers were only following a natural, human, inborn instinct and impulse. They were not satisfied, and could not be, with the severely utilitarian notions which would eradicate from their natures all the "pride of the eye." Years have gone by, and the desire for ornament which smoked the white walls has developed into a general sentiment. Among the rich and poor the poetic side of life has invaded the practical. Things which were once exceptional are now matters of course; with every advance in art, and especially in architecture and housebuilding, there is improvement in the modes of living. The ministering to this improvement furnishes the population with the means of living. Neatness in costume, and even elegance, with those who can command the expense it involves, have a salutary influence upon the condition of humanity. It would be a mistaken policy that would go back to pewter platters and wooden spoons and to gourd shells as drinking vessels, and hold this to be evidence of thrift and virtue and innocence. Our commonest household furnishing is better to-day than the feudal barons could command. The journeyman of to-day has a better furnished home than the master mechanic had fifty years ago; and the advance of civilization keeps pace with the improvement in the food, the dress, and the houses of the people.

AMERICAN SILK VELVETS.

THE manufacture of silk velvet has never been thoroughly established in this country. In 1864 a velvet mill was built in Paterson, a number of leading American dry-goods merchants and importers being stockholders, among them the late A. T. Stewart. The company expended about $200,000 in buildings, machinery, etc., and produced some very fine velvets and plushes; but the stockholders took so little interest in the enterprise that it was allowed to run down, and the mill, after standing idle for six or eight years, was recently turned into a silk mill. Recently some of the Paterson manufacturers have turned their attention to the subject, and one of them has just completed a piece of tartan-finish silk velvet, which is said to be the finest ever made in America and to be equal to the best imported. The manufacturers are sanguine that a great industry will be developed in Paterson in the production of silk velvets. Paterson now makes three-fourths of all the American silks.

ONE HUNDRED CHOICE HOUSEHOLD RECEIPTS.

THE following receipts have been selected with great care, and are practical and economical. Several of them are now published for the first time:

Measures.—Wheat flour, 1 lb. is 1 quart. Indian meal, 1 lb. 2 ozs. are 1 quart. Butter (when soft), 1 lb. is 1 pint. White powdered sugar, 1 lb. 1 oz. are 1 quart. Best brown sugar, 1 lb. 2 ozs. are 1 quart. Ten eggs are 1 lb. A common sized tumbler holds ½ pint. A tablespoonful is ½ oz. Sixty drops equal one teaspoonful. Four teaspoonfuls equal one tablespoonful.

Family Bread.—One quart of sifted flour and half a pint of lukewarm milk; mix these into a smooth batter, and stir into it half a gill of yeast; cover it with flour and set to rise. When it is light, add a little salt and a quarter pound of lard, and knead all well, with sufficient flour to make a soft dough; form this into loaves, place in pans, and set to rise again; when light, bake.

Indian Bread.—Three cups meal, heaped, unless coffee cups, three of flour, one quart buttermilk, dessert spoon soda, one cup molasses. Beat the soda into the molasses. Steam three hours, then put in the oven and bake until brown.

Sally Lunn.—One quart of flour, 3 tablespoons yeast, 3 eggs, 1 saltspoon salt, butter the size of an egg. Make up with new milk into a tolerably stiff batter; set it to rise, and when light pour into a mould, and set to rise again as light bread. Bake quickly.

Muffins.—Boil one quart of milk; when nearly cool stir in one quart of sifted flour, one teaspoonful of salt, one half cup of yeast. Then stir in three well beaten eggs. Let it rise in a warm place in winter and a cool one in summer. When light, stir in one tablespoonful melted butter and bake in muffin moulds.

Corn Muffins.—Three eggs beaten light, one pint of buttermilk (if very sour use less), one teacup cream or milk, one small teaspoon soda. Lard or butter the size of an egg. Meal enough to make the batter the consistency of pound-cake. Bake in muffin rings.

Hot Rolls.—One quart of flour, one teaspoon salt, two eggs, one large tablespoon lard, two tablespoons yeast. Work and knead it well at night, and in the morning work again, make into rolls, let them rise the second time and bake in a hot oven.

Soda Waffles.—One pint of flour, one pint of milk, one teaspoon soda dissolved in the milk, two teaspoons cream-tartar mixed in the flour, two eggs, one tablespoon butter. Beat up and bake quickly.

Waffles.—Three teacups milk, three eggs, one-half cup butter, two heaping teaspoons cream-tartar, one-third the quantity of soda; add flour to make a stiff batter. If you have cream, use one half cream.

Yeast.—Take as many hops as you can hold in your hand twice, three pints cold water; boil twenty minutes; strain into an earthen jar, and scald as much flour in it as will make a stiff batter. When milk-warm add a teacup of old yeast, one teaspoon soda; set in a warm place to rise. When light, meal may be added and made into cakes.

Potato Snow.—Peel and boil six large, mealy, white potatoes; add a little salt to the water; take them out one by one; rub through a sieve into a deep dish, letting it fall in a mound. Do not touch with a spoon or the hand. Serve with melted butter.

Mock Oysters of Corn.—Take a dozen and a half ears of green corn, and grate from the cob as fine as possible; then add two large tablespoons of flour and three eggs. Beat well, and fry as you would oysters, in part butter and part lard, which should be very hot.

Pea Fritters.—Cook a pint or three cups more peas than you need for dinner; mash while hot, seasoning with pepper, salt, and butter; put by until morning; make a batter of two beaten eggs, a cup of milk, quarter of a teaspoon soda, half a teaspoon of cream-tartar, and half a cup of flour. Stir the peas into this, beating very hard, and cook as you would griddle cakes.

Substitute for Cabbage.—Take three good sized white turnips, and chop fine; cook until tender, salt and pepper to taste; then add four tablespoons sweet cream, and a little piece of butter; let it boil a few minutes, then add two-thirds cup of vinegar.

Fried Cucumbers.—Pare, and lay in icewater about half an hour; cut lengthwise into slices nearly half an inch thick, and lay in icewater a few minutes longer. Wipe each piece, sprinkle with pepper and salt, and dredge with flour. Fry to a delicate brown, in nice lard.

Fried Egg Plant.—Slice the egg plant about half an inch thick, pare and lay in salt and water; be sure all the slices are under the brine; let them remain about an hour; wipe each slice, dip in beaten egg, then in cracker crumbs, and then in hot lard until well done and nicely browned.

Veal Frizado.—Three pounds veal cutlet, chopped raw; six Boston crackers, rolled fine; one spoon pepper, one spoon salt, three eggs, mix well; one-half the crackers mixed with the meat, remainder put on top; put in a cake pan, moisten the cracker on top with a little hot water. Bake two hours; when cold, remove from the pan; cut in slices.

Chicken Pie.—Boil the chicken until tender, salt to taste; make a crust with one quart flour, two small tablespoons lard, one teaspoon salt, one teaspoon soda, two of cream tartar, sifted with the flour; two cups sweet milk. Work the lard in the flour as quickly as possible, and make the dough as soft as you can roll out. Line a deep dish with the crust, put in the chicken, with the large bones removed, one small teacup of the chicken broth, a little salt and pepper; cover with the crust, and bake one hour. Serve with gravy made from the chicken broth.

Chicken Salad.—One chicken, chopped fine; four eggs, boiled hard and chopped or mashed fine; two tablespoons mixed mustard, one-half teaspoon cayenne pepper, one-half spoon salt, one-half teacup melted butter, one-half tumbler of vinegar, one teacup cabbage, and one-half cup celery, chopped fine; mix well together.

Oyster Fritters.—Beat two eggs very light; then stir in two tablespoons cream or milk, three tablespoons sifted flour, a pinch of salt; dip the oysters in this, and fry in hot lard.

Fried Oysters.—Drain the oysters through a sieve; beat up two or three eggs; have ready some grated bread or cracker crumbs; sprinkle some salt and a little pepper over the oysters, then dip each oyster into the egg and bread crumbs; have the pan hot and clean; put equal portions of butter and lard in the pan. Fry to a nice brown; be careful and not burn.

Noodles.—One egg, one tablespoon milk, a little salt; mix hard; roll very thin, dry, roll up, and shave like cabbage; put it in boiling water, stir with a fork; boil fifteen minutes, season with butter, salt, and pepper.

Apple Custard Pie.—Three cups stewed apples, six eggs, one quart of milk; make the stewed apple very sweet, and let it cool; beat the yolks of the eggs light, and mix well with the apple, seasoning with nutmeg only. Then stir in gradually the milk, beating as you go; lastly, add the beaten whites, fill your crust, and bake without cover.

Apple Méringue Pies.—Stew and sweeten ripe, juicy apples; put through a colander, and flavor with lemon or vanilla; fill your crust, and bake until just done; spread over the apple a thick meringue, made by whipping the whites of three eggs to a stiff froth, sweetening with powdered sugar, and flavor with lemon or vanilla; set back in the oven until it is well set. Peach pies are very nice made in the same way.

Golden Pie.—Take one lemon, grate the peel, squeeze the juice in a bowl, beat the yolks of three eggs and a tablespoon cornstarch together, sweeten to taste, add enough milk to fill a nice paste crust, add the grated rind of the lemon, and bake slowly. When done, beat the whites of three eggs to a stiff froth, add the juice of the lemon, and sweeten; pour it over the top of the pie evenly, and return to the oven to brown slightly.

Lemon Pie.—The juice and grated rind of one lemon, one cup of water, one tablespoon cornstarch, one cup of sugar, the yolks of two eggs, a piece of butter the size of a small egg; boil the water; wet the cornstarch with a little cold water and stir it in; when it boils up, pour it on the sugar and butter; after it cools, add the egg and lemon; bake in a nice crust. When done, whip the whites to a stiff froth, sweeten, pour over the pie, and return to the oven to stiffen.

Mock Mince Pie.—One cup sugar, one cup molasses, one cup sour cider, one cup chopped raisins, one-half cup butter, two eggs, five pounded crackers, four or five apples chopped very fine, spice to your taste, one cup wine, or another cup of cider.

Baked Apple Dumplings.—One quart flour, two tablespoons lard (half butter is better), two cups of milk, one teaspoon soda dissolved in hot water, two teaspoons cream-tartar sifted into the dry flour, one saltspoon salt; mix the shortening into the flour after you have sifted it and the cream-tartar together, put in the soda and wet up quickly, just thick enough to roll into a paste less than half an inch thick. Cut in squares and lay in the center of each a juicy, tart apple, pared and cored, bring the corners of the squares together, and pinch slightly; bake to a fine brown. Eat hot, with rich, sweet sauce.

Apple and Tapioca Pudding.—One teacupful tapioca, six apples pared and cored, one quart water, one teaspoon salt; cover the tapioca with three cups lukewarm water, and let it soak four or five hours; put the apples in a dish, adding a cup of lukewarm water; cover, and steam them until soft all through; if the dish is more than a third full of liquid, pour some out before adding the soaked tapioca; fill the centers of the apple with sugar, and stick a clove in each; bake one hour. Eat warm, with hard sauce.

Cake Pudding.—One cup sugar, one egg, one tablespoon butter, one cup sweet milk, one teaspoon soda, two cream-tartar; stir as thick as cup cake; bake in layers.

Custard.—One pint milk, one egg, two tablespoons sugar, one tablespoon cornstarch; heat the milk to scalding, stir in the egg, sugar, and cornstarch dissolved in a little cold milk; when cool, pour on the layers of cake; flavor cake and custard with vanilla.

Cottage Pudding.—One teacup of sugar, butter the size of an egg, one cup of milk, one teaspoon of soda, two heaping teaspoons cream-tartar; stir as thick as soft gingerbread; fruit if you like; bake.

Sauce for the same.—One teacup sugar, one pint of water, one tablespoon cornstarch, a small piece of butter; sour a little with currant jelly, or the juice of some canned fruit; heat the sugar and water, and stir in the cornstarch dissolved in a little water; boil a few minutes.

Bird's Nest Pudding.—Cut the rind from oranges or lemons in long, narrow strips, and stew gently in enough water to cover them, until they are tender; add to them half a cup of sugar, and simmer fifteen minutes in the sirup; lay them out to cool, being careful not to break them. Take nine eggs, or as many as you desire, remove the yolks and whites very carefully by making a hole about as large as a half dime in the small end, and wash the interior by shaking water around well in them; then fill with blanc-mange, and set in a pan of flour or meal, that they may not be overturned. When thoroughly set, remove the shells carefully from the blanc-mange, and lay the strips of peel, which represent straw, all around and under the artificial eggs, in the shape of a nest. Eat with sweetened cream.

Indian Pudding.—On a half pint of meal pour a quart of boiling milk, stirring all the time; add one teaspoon salt; beat three or four eggs very light, and when the batter is nearly cold, stir them into it; put in a bag and boil two hours.

Lemon Rice Pudding.—One cup of rice, boiled soft in water; beat together the yolks of three eggs and one cup of white sugar; mix with the rice, and add one quart of milk and the grated rind of one lemon, and bake. When done, beat the whites of three eggs with one-half cup of sugar and the juice of the lemon. Put this over the pudding, and set back to brown. This pudding is very nice.

Plum Pudding.—One teacup molasses, one cup of sweet milk, one teaspoon soda, one tablespoon butter, one pint raisins, chopped; flour enough to make as thick as soft gingerbread, one teaspoon of all kinds of spices.

Sauce.—One cup powdered sugar, half cup butter, two eggs, well beaten; just before served, one tumbler boiling currant wine.

Queen of Puddings.—One and a half cups white sugar, two cups fine dry bread crumbs, five eggs, one tablespoon butter, vanilla, rose water or lemon for flavoring, one quart fresh, rich milk, and one-half cup jelly or jam. Rub the butter into a cup of the sugar, beat the yolks light, and stir these together to a cream. The bread crumbs soaked in milk come next, then the seasoning. Bake in a pudding dish until the custard is set. Draw from the oven, spread over with jam, then cover with meringue made of the whites, whipped, sweetened and flavored to taste.

Rice Cream.—Two heaping tablespoons of raw rice, one quart milk, two tablespoons sugar, a little salt; bake one hour, or an hour and a half, stirring frequently while baking. The oven should be a quick one.

Snow Pudding.—Half a box of gelatine, half a pint of cold water; put the gelatine in the water, let it stand half an hour, then add half a pint of boiling water; after it is cool add the whites of three eggs beaten to a stiff froth, two cups sugar, two teaspoons lemon; beat all together until it becomes a stiff froth. Scald one and a half pints of milk, stir in the beaten yolks of three eggs, sugar to taste, let it get cool, and pour around the pudding. Jelly is nice with it.

Suet Pudding.—One cup molasses, one cup sweet milk, one cup suet chopped very fine, one cup raisins, one teaspoon soda, half teaspoon cloves, cinnamon, nutmeg; steam three hours; flour to make a batter thick enough to drop from the spoon. Eat with liquid sauce. This pudding may be baked if more convenient, and a half teacup of lard or butter may be used instead of the suet.

Tapioca Pudding.—Soak four tablespoons tapioca one hour in a little warm water; beat the yolks of four eggs with a cup of sugar and a little salt; add the tapioca, drained, and stir into a quart of milk; boil it over a kettle of water half an hour, stirring it thoroughly once; beat the whites of the eggs to a stiff froth, add two tablespoons powdered sugar, and put on top, or make a hole and pour the hot pudding in; flavor with vanilla.

Fruit Pudding Sauce.—One-half cup butter, two and a half cups sugar, one dessert spoon cornstarch wet in a little cold milk, juice of one lemon and half the grated peel, one glass wine, one cup boiling water; cream the butter and sugar well, pour the cornstarch into the boiling water, and stir over a clear fire until it is thickened. Put all together in a bowl, and beat several minutes before returning to the saucepan. Heat once, almost to boiling, add the wine, and serve.

Hard Sauce for Puddings.—Stir to a cream one cup of butter, three cups powdered sugar. When light, beat in three-fourths of a cup of wine, juice of a lemon, two teaspoons nutmeg; beat until several shades lighter in color than at first.

Pudding Sauce.—One cupful cream, two cups sugar, one egg well beaten, one tablespoon butter, one teaspoon cornstarch; boil all together till a thick sirup. Take off the fire, and add grated nutmeg and a glass of wine.

Almond Blanc-Mange.—One quart milk, one ounce Cooper's gelatine, three ounces almonds blanched and pounded in a mortar, one tablespoon rosewater, three-fourths cup of sugar; boil the milk, having previously soaked the gelatine in a cup of it for an hour, add the pounded almond paste and the gelatine while the milk is hot, and stir a few minutes before adding the sugar. When the gelatine has dissolved, strain through a thin muslin bag, pressing it well to get out the flavor of the almonds; there should be three or four bitter ones; set in a cool place.

Almond Custard.—One pint milk, half cream; quarter pound almonds, blanched, and powdered to a paste in a Wedgwood mortar, adding gradually two tablespoons rosewater, yolks of three eggs and whites of two, four tablespoons sugar; scald the milk, add the beaten eggs, sugar, and almond paste, boil, stirring constantly, till it thickens; make a meringue of the whites of two eggs and two tablespoons powdered sugar, flavor with bitter almonds, and heap upon the top.

Floating Island.—Set a quart of sweet milk to boil, then stir into it the beaten yolks of six eggs, flavor with lemon, and sweeten to taste; whip the whites of the eggs to a stiff froth, add a little sugar, drop in spoonful on the hot custard until it sets; pour the custard in a deep dish, when it is thick enough, and heap the frothed egg upon it.

Spanish Cream.—Boil in half pint water half an ounce of isinglass, until dissolved; strain, and mix with it one quart of cream, or good milk; stir it until it comes to a boil; when a little cooked, add the beaten yolks of six eggs, a glass of white wine; pour in a dish, sweeten to taste, stir until cold, flavor with lemon or vanilla, put in a form and set in a cool place.

Bread Cake.—Dissolve a teaspoon of soda in a wine glass of milk; strain it on three teacups of raised dough; a teacup of lukewarm melted butter, two teacups sugar, three eggs, two teaspoons cinnamon; fruit if you like. Work the whole fifteen minutes; let it stand fifteen minutes before baking.

Coffee Cake.—One cup sugar, one cup molasses, one cup butter, one cup strong coffee, one teaspoon cinnamon, a grated nutmeg, one cup seeded raisins, two small teaspoons soda; stir in flour until the mixture will drop from the spoon. This receipt will make two cakes.

Chocolate Cake.—Two eggs, two-thirds cup of butter, two cups sugar, one cup of sweet milk, three cups flour, two teaspoons and a half of baking powder; bake in layers. Take a cup and a half of white coffee sugar, put enough water on to just cover it, and boil until it is as thick as sirup; beat it until it begins to look white like cream, then flavor with vanilla, and spread on the layers very quickly; over this layer of cream spread on a coating of chocolate which has been melted by holding a hot stove griddle over it, or in the oven; stir the chocolate smooth before putting on.

Cookies.—One cup sugar, two-thirds cup butter filled with water, one egg, one-half teaspoon soda dissolved in a tablespoon hot water; mix soft, roll quite thin, cut in any desired shape, and bake in a quick oven.

Crullers.—Four tablespoons milk, four of melted butter or lard, six of rolled sugar, heaping, four eggs, one teaspoon salt, one small teaspoon soda, a grated nutmeg; mix stiff enough to roll out easily, and fry in hot lard.

Delicate Cake.—One cup of butter, three cups of sugar, the whites of twelve eggs beaten to a stiff froth, one cup sweet milk, two teaspoons cream-tartar, one of soda, four cups even full sifted flour, two teaspoons essence of lemon; work the butter and sugar to a cream, then add the milk and flour, in which the cream-tartar has been mixed; and lastly, the whites of the eggs and soda.

Dried Apple Cake.—Two cups of dried apples soaked over night, chop quite fine; boil until tender in three cups of molasses and the water which remains on the apples, which

should be about a teacupful; when cold, add a cup of butter, two teaspoons soda, four cups of flour, one-half a nutmeg, one tablespoon cinnamon, and cloves if you like.

Fruit Cake.—Two pounds stoned raisins, two pounds currants, one pound citron, twelve eggs, one pound butter, one pound loaf sugar, one pound flour; make the batter as you would for nice cake, and before adding the fruit stir in four and a half teaspoons cream-tartar, one and a half teaspoons soda, one tablespoon ground cinnamon, four and a half nutmegs, one tablespoon best molasses; add the fruit, by degrees, and one-half cup best brandy. Will keep for six months.

Cheap Fruit Cake.—One cup sugar, one cup sweet milk, one good tablespoon butter, not melted; flour to make as thick as cup cake, one teaspoon soda, two heaping teaspoons cream-tartar, one teacup raisins, seeded, some citron, nutmeg.

French Cake.—Five tumblers flour, half pound butter, one tumbler rich milk, half pound sugar, one teaspoon soda dissolved in water; mix well together, then add three eggs, beaten very light; one teaspoon powdered cinnamon, or nutmeg.

Fig Cake.—Three eggs, one teacup sugar, one teacup flour, one teaspoon cream-tartar, half teaspoon soda; bake in square tins; beat the white of one egg, with powdered sugar enough to make quite a thick frosting; chop, not very fine, five figs, a dozen raisins, a little citron, and about three slices of lemon; stir into the frosting; spread on the layer of cake, and roll up. This cake makes a nice loaf of sponge cake.

Fried Cakes.—One cup sugar, one egg, one large tablespoon butter or lard, one cup sweet milk, one teaspoon soda, two and one-third teaspoons cream-tartar, one teaspoon salt, one nutmeg; mix soft, and fry in hot lard.

Ginger Cookies.—One teaspoon soda, put in a coffee cup; two tablespoons warm water, two tablespoons butter or lard; fill up the cup with molasses; mix soft, and bake in a quick oven; roll thin.

Cold Water Gingerbread.—One cup molasses, one cup cold water, half cup butter, one teaspoon soda, one of ginger, a little salt, flour enough so that the mixture will drop from the spoon.

Ginger Nuts.—Two teacups molasses, one of butter, one tablespoon soda, one of ginger, one teacup hot water, soda dissolved in one-half, and a piece of alum the size of a walnut in the other; mix soft, and bake in a quick oven.

Jelly Cake.—One and a half cups sugar, two eggs, one teaspoon soda, two-thirds cup of butter, one cup sweet milk, two teaspoons cream-tartar, nutmeg; stir thin; bake in jelly tins.

Jelly Cake No. 2.—Two cups sugar, half cup butter, three eggs, one cup milk, three cups flour, one teaspoon soda, two of cream tartar; bake in layers.

Lemon Cake.—Two cups sugar, two cups flour, one-half cup water, whites of five eggs and yolks of four, one teaspoon soda, two of cream-tartar; bake in jelly tins, and spread between the juice and grated rind of one lemon and yolks of two eggs, beaten, and sugar enough to stiffen.

Orange cake may be made in the same way, substituting orange for the lemon.

Neapolitan Cake.—Three-fourths of a cup of butter, two cups sugar, whites of five eggs, two and a half cups flour, one cup milk, one teaspoon soda, two of cream-tartar; flavor to taste. Reserve four tablespoons of this dough for the dark cake. Bake the white in two tins. To the four tablespoons of dough, add half a cup of molasses, one cup of raisins, chopped, half a cup of flour, spices to the taste; bake in two tins; put the dark between the light, spread with jelly; use small coffee cup for measure.

Pound Cake.—One pound flour, one pound sugar, three-fourths of a pound of butter, ten eggs; cream the butter and sugar well together, beat the yolks well, and add the butter, sugar, and flour, and then the whites, beaten to a stiff froth; season with nutmeg and one glass of wine.

Waste Sponge Cake.—One and a half tumblers sugar, one tumbler flour, whites of ten eggs, one teaspoon cream-tartar, a pinch of salt; beat the whites of the eggs and sugar together until they are very light.

Sponge Cake.—Six eggs, the weight of six eggs in sugar, the weight of four in flour, flavor with nutmeg or the rind and juice of a lemon; beat the eggs and sugar together until very light.

Soda Rusk.—Three cups flour, one cup of sugar, one cup sweet milk, two small eggs, butter as large as an egg, two teaspoons cream-tartar, one teaspoon soda, nutmeg.

Silver Cake.—The whites of three eggs, one cup sugar, half cup butter, half cup sweet milk, two cups flour, one teaspoon cream-tartar, one-half of soda. The same for the *Gold Cake*, using the yolks of the eggs.

Water Pound Cake.—One teacup butter, four cups sugar, one cup of water, four cups flour, six eggs, half a teaspoon soda, one teaspoon cream tartar.

Washington Cake.—One pound sugar, one pound flour, one pound fruit, half a pound butter, four eggs, one teacup milk or water, one teaspoon soda, one glass wine, spices.

White Cake.—Whites of four eggs, two cups sugar, one cup sweet milk, half a cup of butter, two teaspoons cream-tartar, one of soda, three cups flour. This receipt makes a very nice layer cake, with grated cocoanut between. It also makes a very nice white fruit cake by adding a pint of chopped raisins and some citron.

Icing for Cakes.—Whites of two eggs, beaten to a froth; one pound of sugar, dissolved and boiled in a small teacup of water; then strain the sugar, and pour it into the egg, beating hard until cool; add one-half teaspoon lemon acid.

Cold Icing.—Whites of three eggs, one pound sugar; beat very light, and season with vanilla or lemon; after beating very lightly, add the white of another egg, and it will give a gloss to the icing.

Cocoanut Macaroons.—Grate the nut, let it dry before the fire; to a pound of the nut and a pound of sugar, put the whites of five or six eggs, beaten to a stiff froth; make out in small cakes, and bake on white paper, in a moderate oven.

Chocolate Caramels.—Two cups sugar, one cup milk, one cup molasses, one teaspoon flour, one cup grated chocolate, lump of butter the size of an egg; boil at least half an hour, stirring all the time; season with vanilla; pour on buttered dishes or pans, and when nearly cold cut into small squares.

Ice Cream.—Dissolve five teaspoons cornstarch in a teacup of milk; add to it the whites of three eggs and the yolk of one, well beaten; sweeten with loaf sugar, and boil half a gallon new milk; as soon as it begins to boil, pour it in small quantities over the mixture of eggs and starch, till about half the milk is taken out; then pour all back in the dish and stir a few minutes; after it cools, add one quart rich cream, season to taste, and freeze.

Strawberry Ice Cream.—Four quarts thick, sweet cream, four quarts strawberries, the berries must be mashed, with a teacup of sugar to each quart; after standing a few hours, strain through a coarse, thin cloth; put four teacups white sugar to the cream, and then add the juice of the berries; whip or froth the cream with an egg-whip or egg-beater; pour two-thirds of the cream into the freezer, reserving the rest to pour in after it begins to freeze. Raspberry cream may be made in the same way.

Vanilla Ice Cream.—Boil half a vanilla bean, cut in small pieces, in half a pint of rich new milk; when cool, strain and add two quarts thick, sweet cream; sweeten with two heaping teacups powdered sugar, and whip to a stiff froth; pour into a freezer, reserving one-fourth of the cream; as soon as it begins to freeze, stir from the sides with a large iron spoon, and beat hard; add the remaining cream when it begins to sink; beat every time the freezer is opened; when frozen, set in a dark place until wanted.

Fruit Ices.—To the juice of twelve oranges and two lemons add three-fourths of a pound of pulverized sugar; infuse for an hour the yellow rind of three of the oranges (avoiding the white underlying skin, which is bitter) in one pint of water, strain and add this to the juice and sugar, stir well together, and freeze in the usual way. The juice of other fruits may be used in the same way.

Cranberry Jelly.—Wash and pick the cranberries, put them in the preserving kettle with a very small quantity of water, cover closely, and stew till done; pour through a jelly bag without squeezing, measure, and pour the liquid back into the kettle; let it boil up, and remove the scum; then add the sugar, one pound to a pint; boil about twenty minutes, or until it jellies.

Currant Jelly.—Wash the currants, and drain; pick them from the stem, and mash in a press; then put them through a jelly bag; to each pint of juice add one pound good white sugar; boil about twenty minutes, and keep it well skimmed. Put in the glasses hot.

Green Grape Jelly.—Gather Catawba grapes before ripening; pick them from the stem, wash, and put in a stone jar; set the jar in a kettle of cold water, over a hot fire; when the juice comes out of the grapes, take the kettle off and strain the grapes; to each pint of juice, put one pound of loaf sugar; boil twenty minutes.

Quince Jelly.—Quarter or cut up the quinces, and take out the cores; then put them in the kettle, with just enough water to come up even with the quinces; boil until tender, then drain through a sieve without breaking them, though they may be gently pressed; then strain the liquor through a flannel bag, and to one pint of juice add three-fourths of a pound of sugar, and boil fifteen minutes; take care to put it in tumblers as hot as possible.

Gooseberry Catsup.—Four pounds of berries, three pounds sugar; boil until sufficiently thick, then add one tablespoon cloves, one of cinnamon, and three spoons of vinegar, and let it simmer together a short time; then put in cans.

Tomato Catsup.—Take one gallon ripe tomatoes, wash and cut up; cook until tender, then put through a coarse sieve to remove the skins and seeds; after straining, add four tablespoons salt, two and a half tablespoons black pepper, three tablespoons mustard, half tablespoon cloves and allspice, all of the spices ground; simmer, slowly, half away; add a teacup of vinegar when about done.

Chilley Sauce.—Thirty-five large green tomatoes, five large green peppers, ten large onions, ten cups vinegar, twenty tablespoons sugar, five tablespoons salt; chop tomatoes, onions, and peppers fine; boil two hours; bottle, and serve with hot or cold meat.

Cucumber Sauce.—Take fresh cucumbers and grate them, drain off the juice, measure it, and pour on as much cold vinegar as you drain of juice; salt and pepper to taste; put in bottles and cork closely.

Imitation Worcestershire Sauce.—Three teaspoons cayenne pepper, two tablespoons walnut or tomato catsup strained through muslin, three shallots minced fine, three anchovies chopped into bits, one quart vinegar, half teaspoon powdered cloves; mix, and rub through a sieve; put in a stone jar, set in a pot of boiling water, and heat until the liquid is so hot you cannot bear you finger in it; strain, and let it stand in the jar, closely covered, two days; then bottle for use.

Higdum.—Four quarts of green tomatoes, one pint of green peppers, one pint white onions; measure after chopping fine; add one pint white mustard seed, two teacups fine salt, and four tablespoons ground cloves; let it stand over night, strain off the liquid, and pour over sufficient boiling vinegar to cover the whole; put in bottles or cans, and cork closely.

Cucumber Pickles.—Wash the cucumbers well, taking care not to break the skin; do not break the stems off close; drain; put a layer of cucumbers in a stone jar, then a layer of salt, then another layer of cucumbers, another layer of salt, and so on; pour on boiling water enough to cover them, let them stand for twenty-four hours, pour off the water, drain the cucumbers, pour on clear boiling water, and let them stand for twenty-four hours; take some weak vinegar, let it come to a boil, drop in the cucumbers, and let them just scald through; then take some good cider vinegar, enough to cover them, add one ounce cassia buds, some stick cinnamon, a little brown sugar; let it come to a boil, and pour over the cucumbers; when cool, put in a piece of horse-radish root to keep the vinegar clear; set in a cool place, and stir up the vinegar once a week.

Pickled Plums.—Seven pounds plums, three pounds sugar, one quart vinegar; boil the sugar and vinegar together, strain, and turn the boiling mixture over the plums three or four times, or the plums may be dropped into the hot sugar and vinegar for a few minutes.

Pickled Peaches.—Take six pounds sugar, two quarts vinegar, half bushel peaches; melt the sugar in the vinegar, rub the nap from the peaches, stick in two cloves, drop them in the vinegar, and let them scald; put them in a jar, boil the vinegar a little, turn over them, and cover close.

Preserve Pickled Peaches.—Twelve pounds peaches, six pounds sugar, one pint vinegar; drop them into boiling water two minutes, wipe them dry without breaking the skin; cook them in the sirup, a few at a time, until done.

Seed Cucumber Pickles.—Pare and cut in slices, lengthwise, an inch and one-half or two inches in width, as many as two quarts of vinegar will cover; let them remain twenty-four hours; then take out and drain; put two pounds of sugar to one quart of vinegar and one ounce of cassia buds; when scalding hot put in the cucumbers, and boil fifteen or twenty minutes.

Elderberry Wine.—Mash the berries, and to every quart of berries add two quarts of water; let them boil ten minutes; then strain through a coarse cloth; to every quart of juice add three-quarters pound of sugar; then add a little ginger, cloves, and pepper; boil fifteen minutes; then pour into a crock; when about milk-warm put some yeast on both sides of a piece of toasted bread, and lay on the top to make it work; let it stand near the stove twelve or fourteen days; then bottle up tight or put in a tight cask.

Grape Wine.—Put twenty pounds of ripe fresh-picked grapes into a stone jar, and pour on them six quarts of boiling water; when the water has cooled enough, squeeze the grapes well with the hand, cover the jar with a cloth, and let it stand for three days; then press out the juice and add ten pounds crushed sugar; after it has stood for a week, scum, strain, and bottle it, corking loosely; when the fermentation is complete, strain it again, corking tightly; lay the bottles on their sides in a cool place.

For Invalids—Arrowroot Custard.—Two cups boiling milk, three heaping teaspoons arrowroot, wet up with a little cold milk, two tablespoons white sugar, beaten with one egg. Mix the arrowroot paste with the boiling milk, stir a few minutes; take from the fire, and whip in the egg and sugar; boil two minutes longer, flavor with vanilla or rose-water, and pour into moulds.

Arrowroot Jelly.—One cup boiling water, two heaping teaspoons best Bermuda arrowroot, one teaspoon lemon juice, two teaspoons white sugar; wet the arrowroot in a little cold water and rub smooth; then stir into the hot water, which should be on the fire, and actually boiling at the time, with the sugar already melted in it, stir until clear, boiling all the time, and add the lemon; eat cold, with cream and sugar, flavored to taste.

Arrowroot Blanc-Mange.—Three cups of new milk, two and a half tablespoons arrowroot, wet up with cold milk, three-quarters cup sugar; flavor to taste; mix up the arrowroot smoothly with some of the cold milk; heat the remainder to boiling; add the arrowroot, stirring constantly; when it begins to thicken, put in the sugar, and cook several minutes.

Beef Tea.—Take one pound good lean beef, chop quite fine; put one pint of cold water on it, and let it stand an hour; then boil slowly twenty-five minutes; salt to taste.

Indian Meal Gruel.—Two quarts of boiling water, one cup of Indian meal, one tablespoon flour, wet up with cold water; salt to taste, and, if you like, sugar and nutmeg; wet the meal and flour to a smooth paste, and stir into the water while it is boiling; boil slowly half an hour, stirring up well from the bottom.

Eau de Cologne.—Six quarts eighty-two per cent. alcohol, two ounces essence of orange, two ounces essence of citron, two ounces oil des petits grains, one ounce de cedro, one ounce de cedron, one ounce de Portugallo, one ounce neroli, half ounce rosmarinol, one-quarter ounce thymol.

HOW THE ALPS WERE FORMED.

PROFESSOR JUDD, of the Royal School of Mines, London, gave recently an interesting explanation of the formation of the Swiss Alps. The results of geological observations, he said, show that four stages can be recognized in the history of these Alps. First, the existence of a line of weakness in the earth's crust nearly coincident with the line of the present mountains. This is evidenced by the fact that along this line of weakness there were volcanic outbursts, the results of which can still be traced. Secondly, there followed along this line of weakness a depression, and in this huge "trough" of miles in extent there were accumulated sands, limestones, and clays by various forms of water agencies, and by animals living in the waters. Thirdly, there followed the consolidation of these soft and loose materials. There is evidence that the accumulation was of from six to seven miles in thickness, and the mere weight of the superincumbent material on the lower strata would have a share in effecting consolidation. But this was not all. Under this vast covering heat had led to crystallization from fusion. There was, too, the crushing in from the sides of the trough. This was illustrated by a model of the late Sir H. de la Beche, where lateral pressure was employed on layers of different colored cloth, showing how crumpling resulted, with uplifting of parts of the accumulated mass. Fourthly, there had been the sculpturing of all this into its present form, which was the work of rains and frosts. Some of the existing peaks, even 3,000 feet high, were composed entirely of the disintegrated material resulting from the action of the water, either as ice in glaciers or as rain and streams. The amount of material removed in this way was so stupendous it was almost staggering to try to grasp the facts. The sculpturing of the contours is still going on. This fourth stage was of quite recent date, speaking geologically; but the whole history involved a lapse of time which at the beginning of this century philosophers would not have been prepared to grant, even if this since-acquired knowledge of facts had been presented to them.

PIPE WOOD.

MUCH of the wood used for making the so-called brier-root pipes is derived from Corsica. The white heath, or Bruyère, of which brier is a corruption, grows in great luxuriance and very abundantly among the trees and shrubs which form what is called the "Marquis" covering the mountain sides. In the course of the last few years, since brier-root pipes have become such a large article of trade, the heath trees have become a source of lucrative industry. The roots are dug up and cut into rough forms of tobacco-pipes by circular saws worked by the water power of the mountain streams. The pieces when cut up are sent in sacks to France, and thence to America, to be eventually manufactured into "brier-root pipes."